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14. ABSTRACT Mild traumatic brain injury (mTBI) is one of the major health problems facing military servicemembers returning from deployments. White matter axonal damage, as measured by neuroimaging techniques like Diffusion Weighted Imaging (DWI), is one of the hypothesized mechanisms contributing to the cognitive and affective sequelae of mTBI. Presently, many of the findings in the literature examining the association between DWI and neuropsychological outcome are contradictory, possibly due to differences in stage of recovery at the time of assessment. This study will address this problem by collecting measures of white matter integrity and concomitant neuropsychological status at five time points in the first year following an mTBI. During the first year, study preparations, including ethical approval, hiring and training of new staff, purchasing of equipment and materials, and validation of neuroimaging protocols, were completed ahead of schedule. During the past year, we have collected usable data from a total of 13 participants. These data have been cleaned and preliminary analyses suggest that we are able to identify meaningful trends in the data, although the sample is still far too small to make valid conclusions.					
15. SUBJECT TERMS TBI, traumatic brain injury, concussion, DWI, Diffusion Weighted Imaging, white matter, brain imaging, neuropsychological performance, neurocognitive performance, structural connectivity					
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INTRODUCTION:

Between the years of 2000 and 2015, military personnel have sustained over 327,000 traumatic brain injuries (TBIs) (DVBIC Report, 2015). Of these injuries, the vast majority, exceeding 82% of all TBIs, are in the mild category. In addition to the impact on military readiness, mild traumatic brain injury (mTBI) represents a major health concern and economic burden in the United States (Humphreys, Wood, Phillips, & Macey, 2013). While most individuals who sustain an mTBI will recover fully within a matter of days (McCrea et al., 2003), a significant proportion of individuals with mild TBI will experience a prolonged recovery with persistent post-concussive symptoms, and it is yet unclear why some individuals will show a good injury outcome, whereas other will not (Bogdanova & Verfaellie, 2012; Lange et al., 2012; Lange, Brickell, Ivins, Vanderploeg, & French, 2013; Leong, Mazlan, Abd Rahim, & Ganesan, 2013). Structural damage to white matter axonal tracts has been suggested to underlie many of these persistent behavioral changes (Arenth, Russell, Scanlon, Kessler, & Ricker, 2013; Jorge et al., 2012; Morey et al., 2012; Spitz, Maller, O'Sullivan, & Ponsford, 2013; Yeh et al., 2013). Yet due to differences in brain imaging methods, neuropsychological testing approaches, and sample characteristics, this has not been consistently demonstrated at different recovery stages. Furthermore, the relationship between structural connectivity, functional connectivity and neuropsychological performance remains unclear. The present study aims to systematically assess structural connectivity, functional connectivity and neuropsychological functioning at five recovery stages (i.e., two weeks, one month, three months, six months and 12 months) following mild TBI relative to healthy controls. We hypothesize that structural white matter tract disintegrity will underlie abnormalities in functional connectivity, neurocognitive performance and post-concussion symptom severity, but that these metrics will vary with time since injury. The primary aim of the proposed study is therefore to investigate whether measures of white matter disintegrity following mild TBI would explain abnormalities in functional connectivity of the brain, cognition and emotional disturbance, and whether white matter integrity (or lack thereof) could serve as a reliable biomarker of mild TBI. This will allow conclusions on the utility of measures of white matter integrity in the diagnosis of mild TBI. As the study incorporates five time points of measurement to represent different recovery stages of mild TBI, this will allow conclusions on the natural recovery course of mild TBI and the utility of white matter integrity measures in the prediction of injury outcome. In brief, we aim to collect data from 180 participants, including 30 healthy controls and five separate samples of 30 participants at various time points following injury, ranging from 2 weeks to one year post-concussion (see Figure below). During this cross-sectional study, participants will attend a single assessment session comprising a series of neuroimaging scans, including diffusion tensor imaging (DTI), structural volumetric scan, and resting state functional connectivity (rsFC). Additionally,



Basic Study Design. A total of 180 participants will be assessed. Six (6) groups of 30 participants with mTBI will be scanned at various time points ranging from 2-weeks to 12-months post-injury. We will also collect diffusion weighted scans from 30 healthy controls (HC).

participants will also undergo a comprehensive neuropsychological assessment battery. We will analyze differences in structural and functional connectivity across these various stages of recovery and associated differences in neurocognitive performance and symptom expression.

2. KEYWORDS:

TBI, traumatic brain injury, mTBI, mild traumatic brain injury, concussion, DWI, Diffusion Weighted Imaging, white matter, brain imaging, neuropsychological performance, neurocognitive performance, structural connectivity, brain injury, head injury

3. ACCOMPLISHMENTS:

Major Task 1: Study Preparation, Staff Hiring, and Materials Acquisition - Ongoing

- There continues to be sufficient study materials and equipment to gather data for the remainder of the project period. Study materials and research equipment remain available and ready for data collection as appointments are scheduled.
- Testing protocols have been developed and all staff members involved in the study continue to receive proper training to ensure protocols are adhered to throughout the duration of the study.
- There has continued to be normal turnover in research technicians and staff and new technicians continue to be trained to replace those who have left. The study coordinator recently left the lab to attend graduate school and a new study coordinator has assumed responsibility for the daily operation of the study.

Major Task 2: Human Subjects Approval – Complete

- The University of Arizona Institutional Review Board and the U.S. Army Human Research Protections Office (HRPO) have approved the current protocol for human subjects research. Amendments are submitted as needed and all annual continuing review reports continue to be submitted to the UA IRB Office and HRPO prior to their annual due dates.

Major Task 3: Advertisement and Subject Recruitment – Ongoing

- Recruitment for the study remains modest but consistent, with minor fluctuations throughout the year depending on school/vacation seasons.
- Recruitment flyers for the study are placed throughout local businesses, university and college campuses, federal buildings, clinics, and social media pages. The University of Arizona campus remains our most popular recruitment site, closely followed by the EPIC medical database at the Banner/University of Arizona Medical Center, and ‘word of mouth’.
- The EPIC database enables us to recruit participants recently admitted to the emergency room at the Banner/University of Arizona Medical Center in Tucson. Through the EPIC database, a letter providing information about our study is sent directly from a physician to the individual recently admitted to the Banner Emergency Department. Fourteen days after the letter has been sent, study staff will reach out to these individuals by phone to see whether they are interested in participating in the study. Since establishing this method of recruitment in the Spring of 2017, it has quickly become one of our top recruitment sources for this study. This database has also made obtaining head injury documentation more streamlined, as all individuals with a diagnosed concussion in the database have medical documentation.

- Paid advertisements over the reporting period include local newspapers and radio ads. Additionally, we have recently implemented a new paid recruitment service for clinical trials called “Studykik.” Studykik is a clinical trial recruitment company that uses social media to strategically target individuals who might qualify for our study. We’ve been using Studykik for the last month of this reporting period and have screened 57 interested individuals through this recruitment outlet, 3 of whom were eligible to participate in the study.
- For patients with reported head injuries, a total of 224 phone screens were conducted during this reporting period, resulting in 40 eligible mTBI participants.
- For healthy control individuals, 25 were phone screened resulting in 7 eligible participants. Healthy controls were recruited through flyer postings at local businesses that have previously been approved by a site authorization.

Major Task 4: Data Collection - Ongoing

- Data collection for the mTBI and healthy control groups has continued with good success over this past year. In this reporting year, we have enrolled a total of 24 participants. Of those enrolled, 22 completed the study and 2 were deemed ineligible after further evaluation. One mTBI subject was flagged for substance dependence on the MINI and the other, who was recruited as a healthy control, was flagged and disqualified for a past suicide attempt.
- MTBI Sample: Of the 40 participants deemed eligible after phone screenings during this past year:
 - 19 were enrolled (18 completed the study, and 1 was ineligible after enrollment)
 - 9 were lost to follow-up
 - 12 are scheduled for data collection next quarter.
- Healthy Control Sample: Of the 7 healthy control individuals that were deemed eligible after phone screenings during this past year:
 - 5 were enrolled (4 completed the study, 1 was ineligible after enrollment)
 - 2 were lost to follow-up.
- In total, 62 people completed the study since data collection started at the University of Arizona on 15 APR 2017. Each of the study groups are being populated fairly evenly. At present these groups include:
 - 20 healthy controls
 - 7 mTBI at 2-weeks post-injury
 - 11 mTBI at 1-month post-injury
 - 7 mTBI at 3-month post-injury
 - 7 mTBI at 6-month post-injury
 - 10 mTBI at 1-year post-injury
- To date, no negative outcomes have been reported by any study participants.
- Behavioral data are regularly entered into the RedCap database by two independent research assistants. This enables the study coordinator to check and correct any potential data entry errors.
- Neuroimaging data are uploaded to laboratory computers and all identifying information is removed (de-identified) the same day of scanning. Diffusion tensor imaging (DTI) data is pre-processing within 4 business days.

Major Task 5: Quality Control Checks – Ongoing

- During this reporting year, we have increased our efforts in quality control checks after discovering a number of inconsistencies during the data during processing and preliminary data analysis.
- Neuroimaging data is visually checked for movement and artifacts during data acquisition and throughout the pre-processing pipeline. This ensures proper scan sequences are selected and allows us to track corrections. Neuroimaging data are checked for correct acquisition parameters during acquisition and during the pre-processing pipeline. Any deviations from standard protocol are noted in writing. Data collected with parameters that deviate from standard are labeled and segregated for further processing.
- We have begun noting any details found in head injury documentation before running subjects to confirm date of injury during study visit and avoid injury date discrepancies.
- Two independent scorers check all behavioral data for completeness and correctness before entering into the database. After scoring is validated, data is entered twice into RedCap by independent research assistants and then cross-validated for correctness to avoid error.
- This past year, we also focused on inter-rater reliability for our test administrators. To improve scoring reliability, additional staff training was provided by a postdoctoral researcher and clinically licensed Speech-Language Pathologist. In an effort to maintain quality data and consistencies across the data set, past files have also been re-checked for scoring and completeness.

Major Task 6: Preliminary Analysis – Ongoing

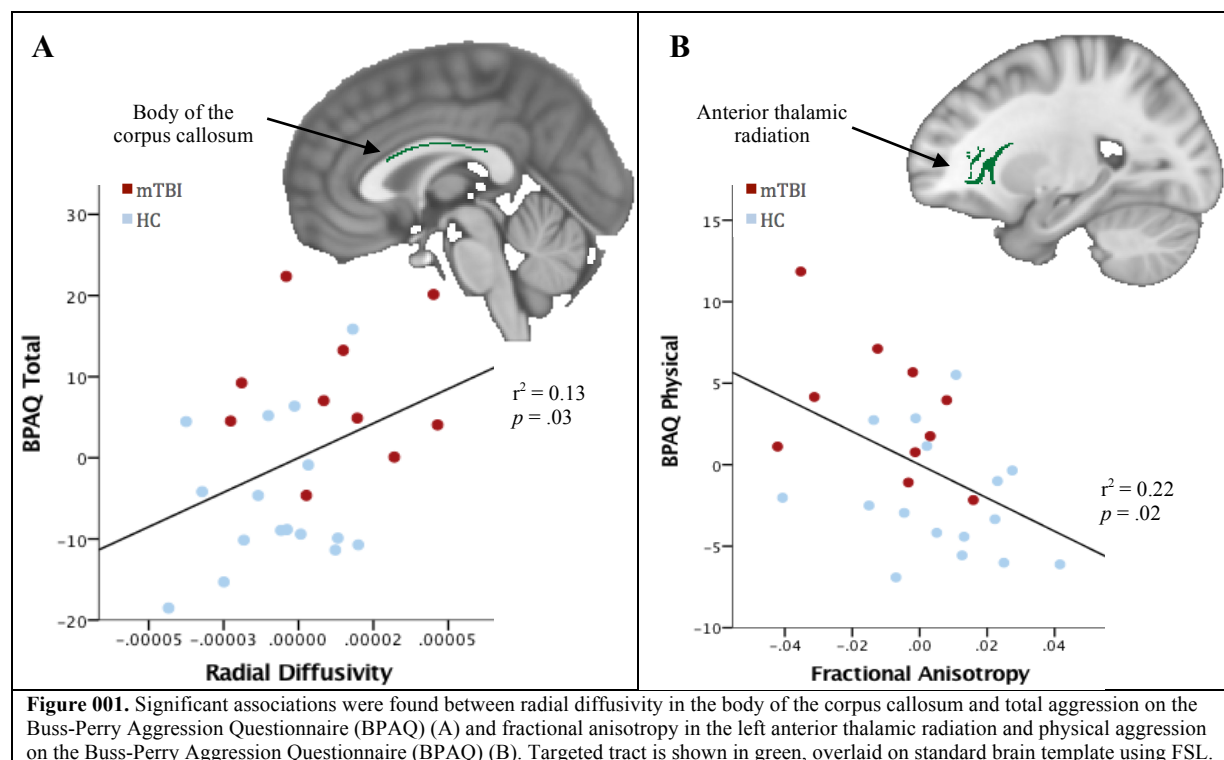
- Over the past year, we have performed the following preliminary analyses. This allows us to ensure data is being collected correctly and to report emerging data to the communities affected by mTBI. The following is a summary of some of the findings from these preliminary analyses:

White Matter Pathways Associated with Post-Concussion Aggression

We have been particularly interested in the association between mTBI and aggression, as this has particular applicability to Service members who must work closely in small teams and also may find themselves expressing aggression in inappropriate circumstances with family or fellow Service members. Aggression is one of the most commonly reported post-concussive symptoms, with upwards to 40% of individuals reporting increased levels of aggression, hostility, and/or irritability after sustaining a mTBI.

Initial Sample: In an initial analysis, we examined the association between white matter axonal changes and aggression in patients at different stages of time since sustaining their injury. Specifically, we compared aggression in healthy controls ($n = 16$) and chronic mTBI ($n = 10$) using the Buss-Perry Aggression Questionnaire (BPAQ) and the Personality Assessment Inventory (PAI). Our preliminary analysis revealed elevated levels of total aggression, physical aggression, anger on the BPAQ, and elevated aggressive attitude, verbal aggression and total aggression on the PAI, in the mTBI compared to healthy control group. White matter integrity between the two groups was measured using DTI, revealing significantly reduced integrity in the bilateral anterior thalamic radiation (ATR) and corpus callosum (CC) in the mTBI compared to health control group. Finally, we examined the relationship between white matter integrity and aggression. Preliminary findings showed reduced white matter in the anterior thalamic radiation was associated with higher levels of aggression (see Figure 001). Our results suggest disrupted

frontal pathways could be part of the underlying neural mechanisms associated with impaired emotional processes. Furthermore, our findings highlight the potentially persistent nature of post-concussive symptoms in mTBI.



Expanded Sample: We subsequently followed up with additional comparisons in larger samples as more data were acquired over this past year, which allowed us to examine data in the post-acute stage as well. It was hypothesized that individuals with mTBI would report higher levels of aggression, which would be associated with reduced white matter integrity in four, bilateral frontal pathways. For this analysis, 37 individuals participate, including 16 healthy controls, 11 mTBI patients in the post-acute stage (1-month or less since injury), and 10 mTBI patients in the chronic stage (6 months or longer since injury). Demographic data are listed in the table below:

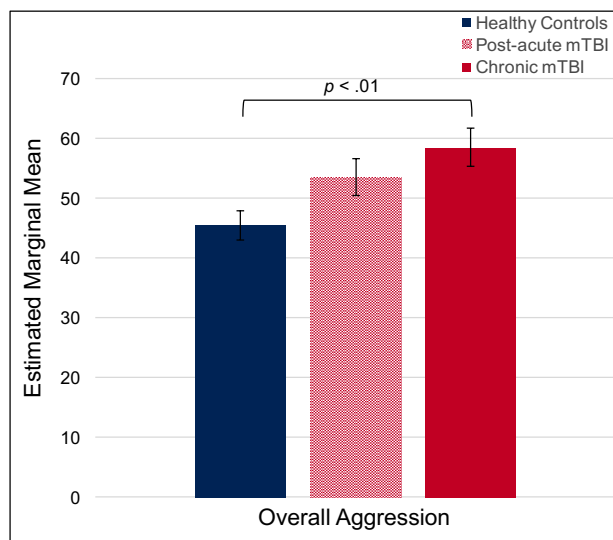
Table 1. Demographic characteristics of all groups

	HCs (n=16)	Post-acute (n=11)	Chronic (n=10)	Statistic
Age, in years	22.69 (3.40)	25.91 (8.68)	22.40 (6.38)	<i>F</i>
Sex – M/F	8/8	6/5	3/7	χ^2
Education	14.19 (2.43)	14.82 (2.86)	12.80 (1.55)	<i>F</i>
WASI-II IQ	111.31 (9.69)	115.09 (16.54)	111.90 (12.90)	<i>F</i>

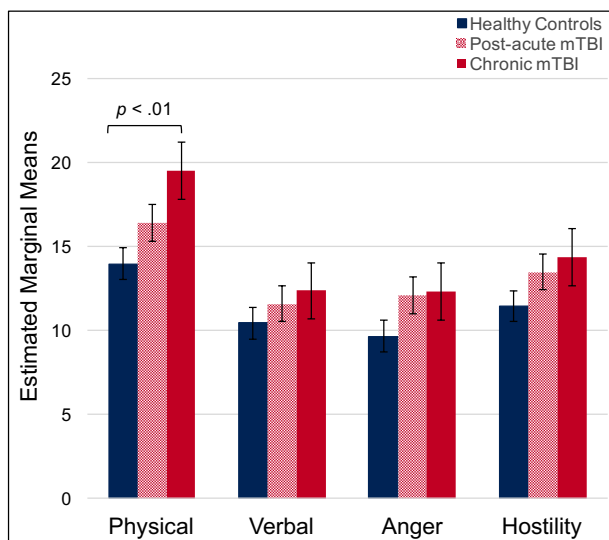
Note: Values are Mean (Standard Deviation) unless otherwise noted. WASI-II = Wechsler Abbreviated Scale of Intelligence – 2nd Edition; * *p* < .05

Participants completed the Buss-Perry Aggression Questionnaire (BPAQ) and underwent diffusion tensor imaging (DTI) at 3T. The Buss-Perry Aggression Questionnaire (BPAQ) is a 29-item self-report measure of overall aggression and 4 sub-scales including physical aggression, verbal aggression, anger, and hostility. Diffusion Tensor Imaging (DTI) was collected using single-shot echo planar imaging (EPI) with 78 directions using b-value of 0 and 1000 s/mm² (thickness = 2mm; voxel size = 2x2x2mm; TR = 9600ms; TE = 88ms; FOV = 100; matrix = 128 x 128 x 74). Binary masks were created for frontal pathways using the JHU ICBM-DTI-81 atlas, and targeted the corpus callosum, cingulum, uncinate fasciculus, and anterior thalamic radiation.

Buss-Perry Aggression Questionnaire (BPAQ). An ANCOVA, controlling for age and gender, showed significant group differences for overall aggression ($F(2,32) = 5.52, p < .01, d = 1.19$) and physical aggression ($F(2,32) = 5.83, p < .01, d = 1.22$). As shown in the figures below, the chronic mTBI group scored significantly higher on total aggression than the healthy controls. There was a trend toward greater aggression among chronic relative to post-acute mTBI, but this difference did not reach significance in the current analysis. We further explored the different facets of aggression and found that the differences were driven primarily by Physical Aggression, which was significantly higher among those in the chronic group versus the healthy controls. Other differences were not significant, but the sample sizes are still too small to draw reliable inferences, and we await confirmation as the sample sizes are increased.



The **chronic** mTBI group reported significantly higher overall aggression, compared to HCs ($p < .01$).



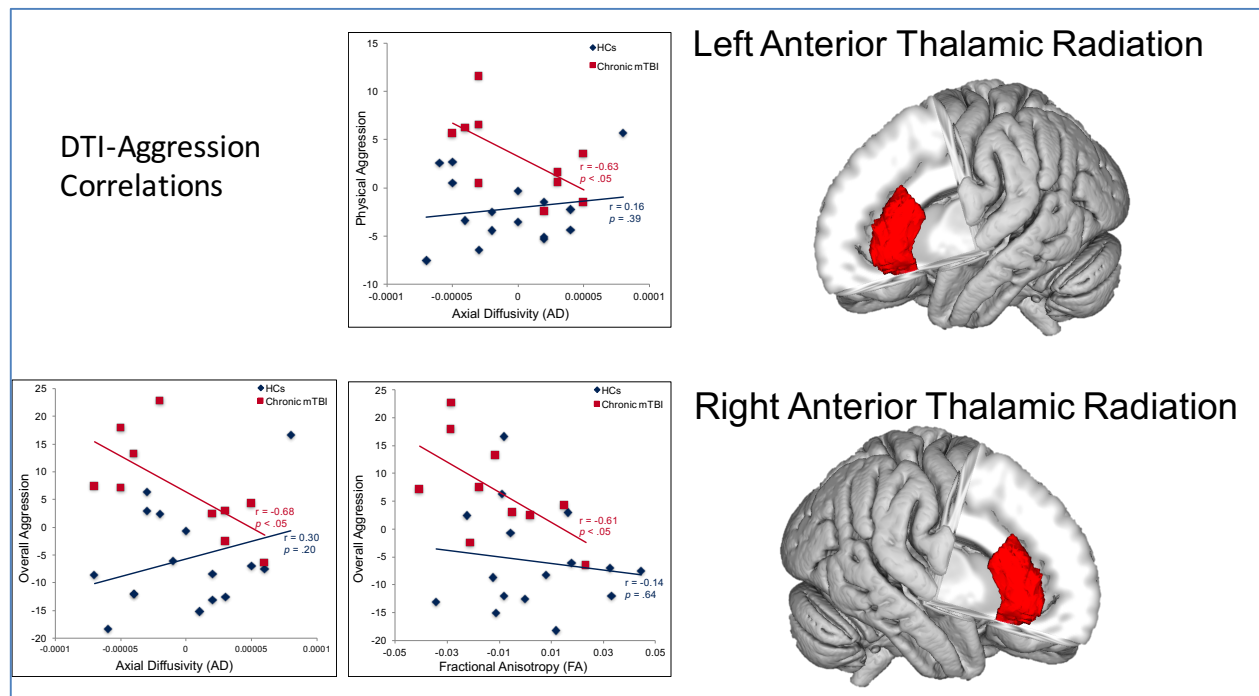
The **chronic** mTBI group reported significantly higher physical aggression, compared to HCs ($p < .01$).

Tract-Based Spatial Statistics (TBSS). TBSS was used for non-linear registration to standard space and projection to an alignment-invariant 4D mean skeleton (threshold .2) on an individual subject level. Mean DTI metrics were derived from the 4D skeleton for each participant, including Fractional Anisotropy (FA), Mean Diffusivity (MD), Radial Diffusivity (RD), and Axial Diffusivity (AD). Anatomical masks were used to extract mean DTI metrics for all fiber pathways of interest, for each subject. MANCOVAs (controlling for age and gender)

were calculated for each pathway and DTI metric. No significant between-group effects were found for FA, MD, RD, or AD.

Neural Correlates of Aggression. Partial correlations, controlling for age and gender, were calculated between the BPAQ measures of aggression and white matter integrity of targeted pathways. Correlations were restricted to physical aggression and overall aggression, based on behavioral findings.

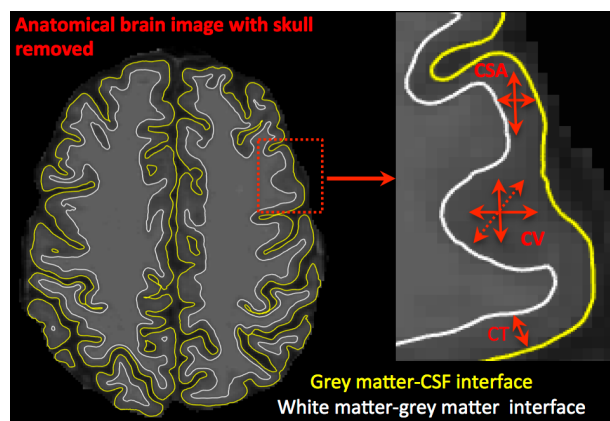
As shown below, in the chronic mTBI group, increased physical aggression was significantly correlated with lower AD in the left anterior thalamic radiation ($p < .05$). In the chronic mTBI group, increased overall aggression was significantly correlated with lower AD ($p < .05$) and FA ($p < .05$) in the right anterior thalamic radiation. Overall, of individuals with a mTBI, only those in the chronic stage of recovery reported elevated levels of aggression, which was associated with reduced white matter integrity in the anterior thalamic radiation. These findings suggest that the associations between tract myelination and emotion behaviors are complex and dynamic *across* the recovery process.



Gray Matter Morphology Differences Across Time Since Injury

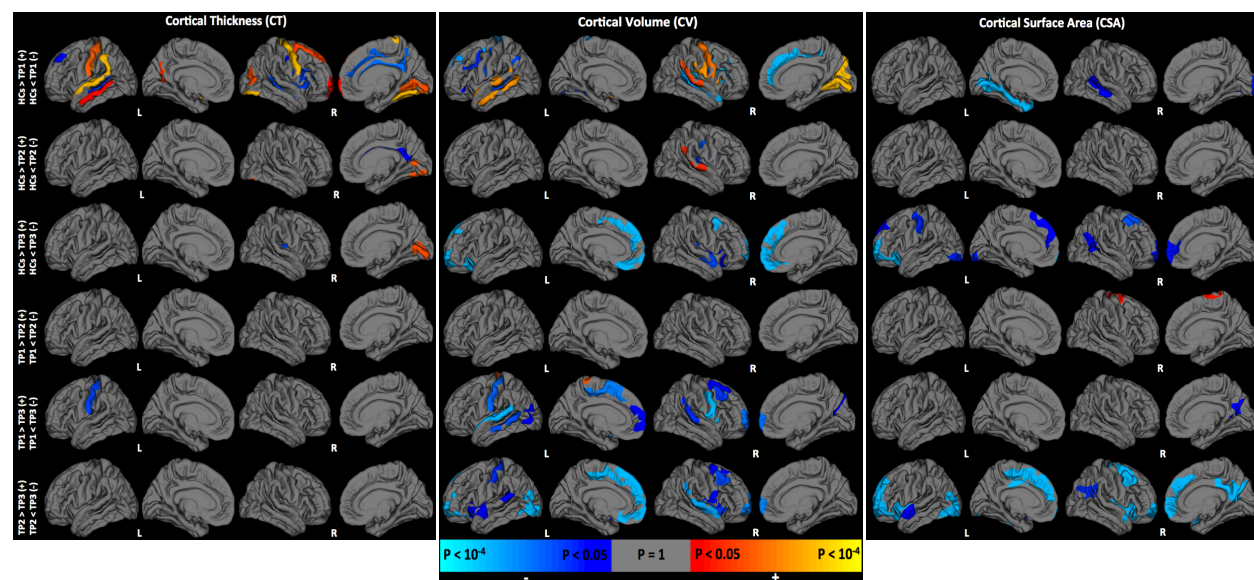
One goal of this project is to identify structural changes in the brain over time following an mTBI, including changes in both white matter axonal tracts, as well as changes on gray matter morphology. Therefore, we also conducted preliminary analyses examining changes in gray matter at different time points since injury, focusing on three inter-related but distinct metrics. We compared differences in brain structure, specifically cortical thickness (CT), cortical volume (CV) and cortical surface area (CSA) in 54 individuals (mean age = 22.40 ± 4.60 years, 33 female) who sustained a recent mTBI and 33 healthy-controls (HCs) (mean age = 24.52 ± 3.03

years, 19 female). The figure shows a representation of these three types of morphological data. Briefly, CT reflects the two-dimensional distance between the inner and outer edge of the cortex, CSA reflects the two-dimensional area reflected at the surface of the cortex, and CV reflects the three-dimensional volume of gray matter at a particular location within the brain.



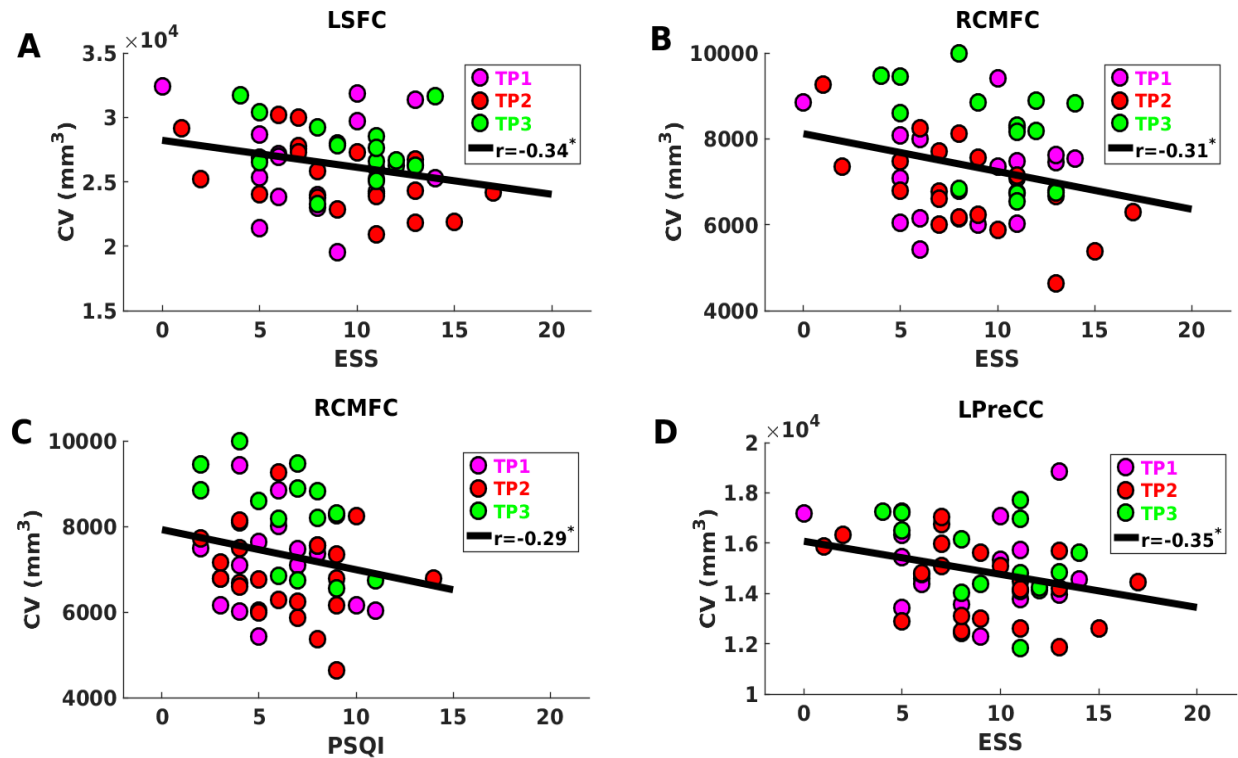
In this study, eligible individuals with mTBI were grouped into one of three sub-categories based on time-since injury - less than 3 months, between 3 to 6 months and between 6 to 18 months. Eighteen individuals experienced an mTBI (mean age = 24.56 ± 6.09 years, 11 female) within the preceding 3 months (TP1), 22 experienced an mTBI (mean age = 21.77 ± 3.53 years, 14 female) between 3 to 6 months prior to evaluation (TP2) and 14 experienced an mTBI (mean age = 20.61 ± 2.56 years, 8 female) between 6 to 18 months prior to the evaluation (TP3).

By comparing structural measures between individuals with mTBI and HCs, differences in (a) CT and CV reflected brain damage in more acute stages of mTBI, and (b) CV and CSA reflected possible partial recovery in the most chronic stage of mTBI. By comparing structural measures across three mTBI groups, we identified several brain areas showing significant differences in CV and CSA.



We also examined sleep complaints among patients in this sample and found negative correlations between (a) daytime sleepiness and CV as well as CSA for the left superior frontal cortex (LSFC), (b) daytime sleepiness and CV, sleep problems and CV, and daytime sleepiness and CSA for the right caudal middle frontal cortex (RCMFC), and (c) daytime sleepiness and CV for the left precentral cortex (LPreCC). However, after correction for multiple comparisons,

these correlations were either not significant or showed a trend towards significance ($p = 0.07$). These associations are displayed in the scatterplots below:



Our findings also demonstrate the role of each structural measure in identifying brain damage during the early post-acute period and compensatory recovery during the more chronic stages of mTBI.

Gray Matter Volume of the Cerebellum is Associated with Poor Sleep Quality in mTBI

While cortical insults are common in mTBI, few studies have actually examined the role of cerebellar damage from mTBI and its association with sleep problems. To follow up on the above-mentioned sleep issues, we conducted additional analyses on the cerebellum using voxel-based morphometry. In the present study, we correlated whole-brain grey matter with Pittsburgh Sleep Quality Index (PSQI) total scores in individuals within one year of an mTBI.

Here, 39 right-handed individuals with a self-reported history of mTBI (14 males; mean age: 24.17 ± 7.11 y) were administered the PSQI as part of a larger on-going study. Additionally, we obtained T1 high-resolution structural scans, which were segmented and normalized (CAT12) and smoothed (SPM12) prior to voxel-based morphometric analysis. Whole-brain grey matter volume (GMV) was correlated with total PSQI scores, after controlling for age, sex, total intracranial volume, and time since most recent mTBI. GMV in significant clusters was exported for further analysis. We found that GMV in a cluster including portions of the left cerebellum's lobules 7 and 8 positively correlated with total PSQI score (FWE corrected, $p = 0.019$), indicating worse sleep. GM volume in this cluster was additionally significantly negatively correlated with faster psychomotor vigilance task mean reaction time ($R^2 = 0.099$) and positively with PVT reaction time coefficient of variation ($R^2 = 0.137$). PSQI total scores did not correlate with any PVT measures and prevented further mediation analysis. Thus, these preliminary

findings suggest that individuals with mTBI who reported lower sleep quality had greater GMV in the left cerebellum. The lack of correlation between total PSQI and PVT performance metrics suggests that increased GMV in the cerebellum may be a compensatory mechanism for maintaining task performance in spite of perceived sleep decrement following mTBI.

Gray Matter Volume Differences Associated with Greater Number of Concussions

While our aforementioned preliminary data, and that of others, suggests that mTBI may, in fact, be associated with changes in gray matter (GM) volume, the direction, timing, and extent of these changes remain unclear. One important factor that may play a role on military concussion outcome is the number of prior concussions. Few studies have investigated the relationship between the number of past mTBIs and GM volume changes. Therefore, we attempted to quantify differences in GM volume with respect to the number of prior head injuries. In this analysis, the T1 high-resolution structural scans of 39 right-handed individuals with a self-reported history of mTBI (14 males; mean age: 24.17 ± 7.11 y) were used for volume-based morphometric analysis (CAT12). Images were segmented and normalized following an automated procedure in CAT12 and smoothed prior to analysis. GM volume was correlated with the total number of self-reported past mTBIs, after controlling for age, sex, total intracranial volume, and time since most recent mTBI. Volumetric data from the single surviving cluster were exported for additional analyses. We found that GM volume in a single cluster encompassing areas of the left superior temporal and supramarginal gyri (proximal to Wernicke's Area) positively correlated with total number of mTBIs (FWE corrected, $p = 0.035$). GM volume in this cluster was additionally significantly positively correlated with Delis-Kaplan executive function system (DKEFS) tasks, including letter fluency ($R^2 = 0.102$) and category switching ($R^2 = 0.106$). Thus, our preliminary findings suggest that in individuals with a history of mTBI, GM volume in the left superior temporal and supramarginal gyrus was greater with increasing numbers of mTBIs. This increase in volume may reflect an adaptive neuroplastic response to increasing numbers of mTBIs that preserves aspects of language-based executive function. Longitudinal studies are needed to identify a causal relationship between mTBI and adaptive neuroplastic processes in the gray matter.

Verbal Fluency Deficits in Post-Concussion Subjects with Associated Sleep Disturbance

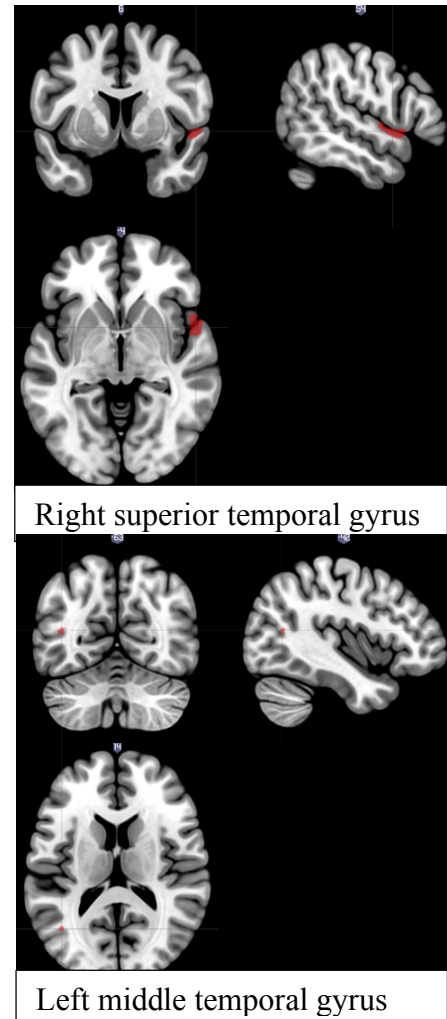
Changes in neuropsychological status was evaluated in mTBI to investigate the relationship between post-concussive symptom severity, associated sleep problems, and executive function abilities in a semantic memory task. We conducted a preliminary analysis on 26 mTBI volunteers who underwent a battery of neuropsychological testing including the DKEFS verbal fluency task, a questionnaire about self-perceived sleep difficulties, and a questionnaire about post-concussive symptom severity (RPCSQ). The most prevalent sleep problems included *greater sleepiness during the day* and greater feelings of drowsiness when concentrating. Overall, we found a significant *negative* correlation between category fluency and symptom severity ($r = -.47, p < .01$) in patients with mTBI. However, the association only reached significance among those reporting sleep disturbances ($r = -.38, p = .03$), but not in those with no sleep disturbances ($r = -.26, p = .22$). While preliminary, these results raise the possibility that some executive function deficits following concussion may be secondary to sleep-related issues. Furthermore, the relationship between category fluency and symptom severity was only significant when individuals experienced sleep disturbance, providing additional support that

deficits in category fluency may relate more to sleep disturbance than post-concussive symptom severity. This will need to be explored further once the full sample has been collected.

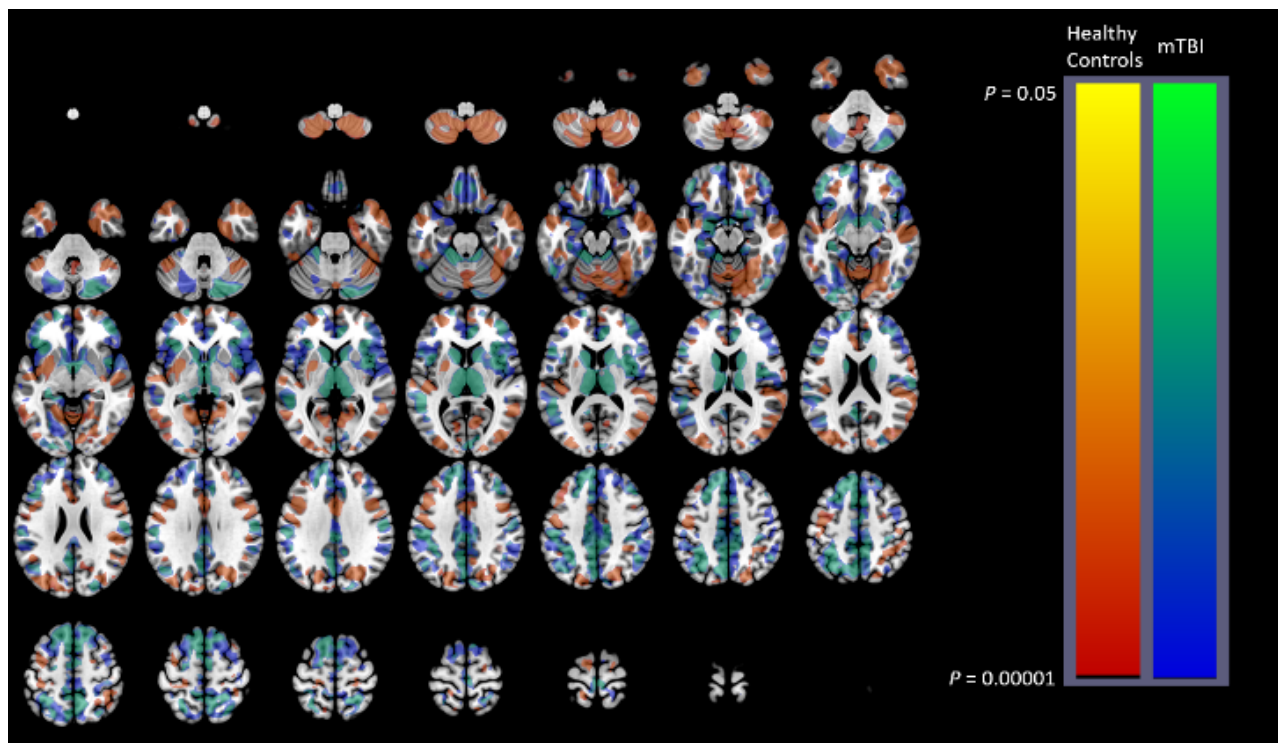
Other Ongoing Analyses

Other preliminary analyses are underway. While not complete, we present these as areas of potential further investigation as we begin to fill in our full sample in the next year or two. These preliminary exploratory analyses include:

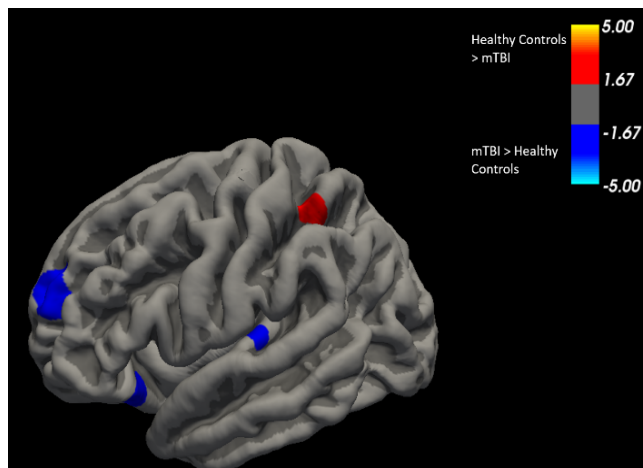
1. Voxel-based comparisons of cortical volume between healthy controls and patients with mTBI. Here, structural MRIs were analyzed using voxel-based morphometry methods available through SPM12/CAT12. Whole-brain statistical comparisons between healthy controls and individuals with a history of mTBI were generated using non-parametric threshold-free cluster enhancement (TFCE) and family-wise error corrected at $p < 0.05$. Individuals with a history of mTBI exhibited **greater** gray matter volume in the right superior temporal gyrus (Brodmann's area 22) and left middle temporal gyrus than the healthy control participants. To date, there are no observed correlations between gray matter volume in these regions and neuropsychological or behavioral outcomes. Correcting these analyses with false discovery rate methods ($q < 0.05$) suggest wide-spread differences between healthy controls and all participants with previous mTBI. These differences based on FDR will be used in future analyses to guide region-of-interest (ROI) analyses.
2. Structural MRIs for healthy individuals and those with chronic mTBI were analyzed using multiple methods including cortical thickness measurements through Freesurfer (v. 6.0) and diffusion tensor imaging (DTI) fractional anisotropy (FA) in FSL (v. 5.0.7).



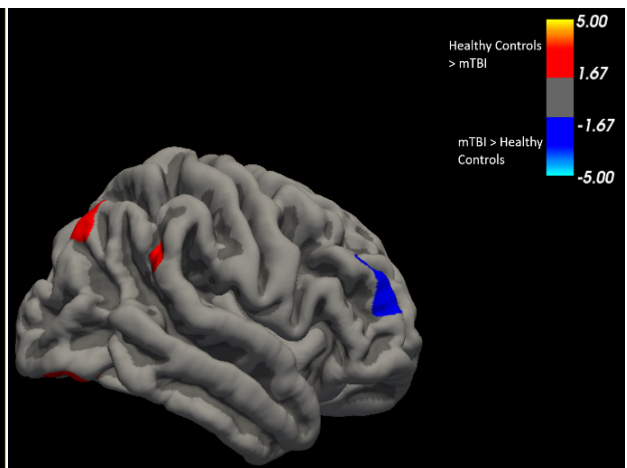
Whole-brain analyses indicate that individuals with a history of mTBI have greater cortical thickness ($p < 0.05$) in the left transverse temporal gyrus, left lateral orbito-frontal gyrus, and bilateral middle frontal gyrus. Healthy controls had greater cortical thickness in the left superior parietal gyrus, right lateral occipital gyrus, right supramarginal gyrus, and right inferior parietal gyrus. These differences do not survive after whole-brain family-wise or false discovery rate error correction. Additionally, there were no whole-brain differences in FA that survived family-wise error correction.



FDR-corrected differences in gray matter volume



Left-hemisphere differences in cortical thickness



Right-hemisphere differences in cortical thickness

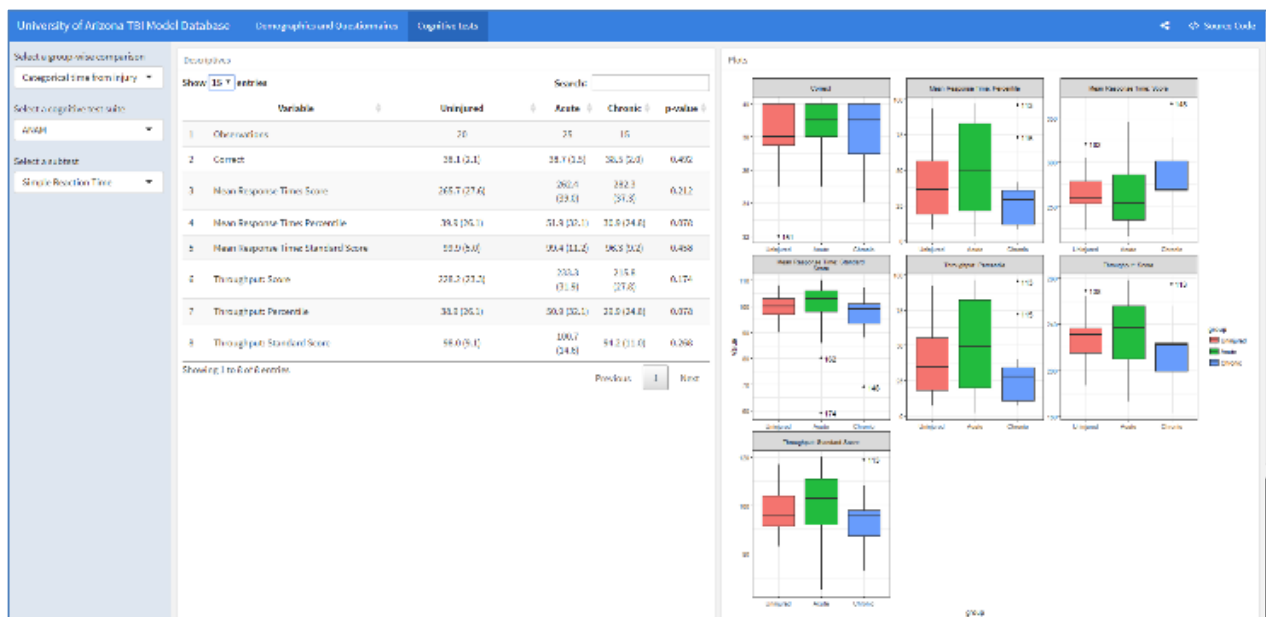
Methodological Advances

For the purpose of visualizing the behavioral data that have been collected, an interactive dashboard was developed. This dashboard runs in a web-interface and allows multiple simultaneous user connections. It provides basic statistical calculations on grouped variables (T-tests and one-way ANOVAs) as well as boxplots of grouped variable distributions. This is a work-in-progress, requiring manual coding for addressing other grouping categories. At present,

the dashboard provides group-level comparisons for:

- 1) Healthy controls vs. All mTBI
- 2) Healthy controls vs mTBI with loss of consciousness vs mTBI without loss of consciousness
- 3) Healthy controls vs mTBI at n = 6 time durations from injury
- 4) Healthy controls vs acute mTBI (≤ 3 months from injury) vs chronic mTBI (> 3 months from injury)
- 5) Healthy controls vs mTBI with self-reported sleep disturbance vs mTBI without self-reported sleep disturbance.

This visualization and basic inference dashboard is aimed at facilitating higher-level, hypothesis-driven inquiry into various aspects of the neuropsychological and behavioral data being collected as well as making connections between group-level differences and neural correlates.



Major Task 7: Extensive Data Analysis – Pending

- Analysis pending final data collection.

Major Task 8: Manuscript Preparation and Submission for Publication – Ongoing

- A manuscript detailing our findings on gray matter morphology differences across time since injury has been submitted and revised and resubmitted for possible publication in the journal Human Brain Mapping.
- Manuscript preparation is ongoing for the preliminary findings regarding aggression and chronic mTBI.

What opportunities for training and professional development have the project provided?

While the primary goal of this project is not to provide training and professional development, many such experiences have occurred for our team members. The present project has supported:

1 member of our lab attended lectures and presented research findings at the International Neuropsychological Society Meeting, New Orleans, LA, February 1-4, 2017.

1 member of our lab attended lectures and presented research findings at the Society of Biological Psychiatry Meeting, San Diego, CA, May 18-20, 2017.

1 member of our lab attended lectures and presented research findings at the Associated Professional Sleep Societies Meeting, Boston, MA, June 3-7, 2017.

1 member of our lab attended lectures and presented research findings at the Military Health Systems Research Symposium, Orlando, FL, August 27-30, 2017.

1 member of our lab attended the Computational Psychiatry Course at the University of Zurich (Zurich, Switzerland), August 28-September 2, 2017.

1 member of our lab attended the Neurometrika SPM neuroimaging workshop, Philadelphia, PA, July 17-21, 2017.

Multiple members of our lab have attended regular training in MRI analysis methods and safety as part of an ongoing training series offered at the University of Arizona.

Multiple members of our lab receive regular one-on-one instruction and supervision in the administration and scoring of neuropsychological assessments, psychodiagnostic testing, electrode placement, and patient interviewing.

2 high school students and 2 college undergraduate students obtained training in research methods during a summer training program in our lab this year, which was sponsored by the University of Arizona.

3 undergraduate honors students were supervised for their Senior Honors Thesis in our lab this year.

1 graduate student was supervised for his Master's Thesis in our lab this year.

Over 10 members of our lab have undergone regular in-house training in the use of various brain-imaging software, including SPM12, Matlab, FSL, Freesurfer, TracVis, MRICron and others.

Over 10 members of our lab have undergone basic training modules in ethical conduct, statistical analysis, and neuroanatomy.

How were the results disseminated to communities of interest?

The poster presentation at the Military symposium allowed results to be disseminated to the military community about recent findings in changes in emotion in the mTBI population in the chronic phase.

What do you plan to do during the next reporting period to accomplish the goals and objectives?

We plan to continue our existing recruitment efforts that we know are effective as well as increase the use of paid advertisements on the radio, in movie theaters, in the mall, and online in an effort to get ahead of recruitment numbers before the MRI scanner typically used is closed early next year. To avoid being negatively affected by this, we plan on actively seeking solutions to keep collecting data during the time of the MRI move. Finally, we hope to establish closer contacts with military populations in Arizona to expand recruitment to more relevant populations.

4. IMPACT:**What was the impact on the development of the principal discipline(s) of the project?**

We expect that the publication of the aggression paper will impact the way people will think about mild TBI. Our findings suggest that adults with mild TBI who are at least 6-months post-injury have persistent elevated aggression symptoms, which opposes the misconception that symptoms resolve quickly after a mild TBI.

What was the impact on other disciplines?

Nothing to report.

What was the impact on technology transfer?

Nothing to report.

What was the impact on society beyond science and technology?

Nothing to report.

5. CHANGES/PROBLEMS:**Changes in approach**

- No changes in approach

Actual or anticipated problems or delays

- During this reporting period, we discovered some minor inconsistencies in the data collection parameters among the behavioral and imaging data.
- Upon the discovery that the MRI scanner was collecting some inconsistent acquisition parameters in the DTI data, we immediately followed up with a more in-depth investigation across the entire data set to determine the extent of these deviations in acquisition parameters. We found that the inconsistency in acquisition parameters only affected a small portion of the more recently acquired data. We discussed the potential causes of the unusual parameters and possible remedies for the affected data with our engineers and physicists, as well as other experts in the imaging community. The source of the inconsistency appears to have been due to some inconsistency at the scanner, but we were unable to determine the precise cause of the deviation. However, implemented several pro-active procedures to mitigate any effects on the current data and protect future data moving forward. In an effort to prevent further deviations, a parameter sheet requiring manual checking of the computerized parameters at each scan acquisition was developed and is now part of our standard operating procedure.
- Among the behavioral data, some inconsistencies in subject self-report of their date of injury were observed in comparison to medically documented head injury date. To mitigate this problem, we established a medically documented date of injury into the RedCap database and document this date prior to running the Study Visit to simply confirm the correct date in patient report.

6. PRODUCTS:

- **Published/Accepted Abstracts/Conference Presentations this year:**

Bajaj, S. Alkozei, A., & Killgore, W. D. S. (June 25-29, 2017) *Dynamics of brain's cortical measures following a mild traumatic brain injury*. Organization for Human Brain Mapping, Vancouver, CA.

Bajaj, S., Alkozei, A., & Killgore, W. D. S. (May 18-20, 2017) Automatic brain recovery following a mild traumatic brain injury. Society for Biological Psychiatry, San Diego, CA.

Gottschlich MK, Hyman S, Millan M, Pisner D, Singh A, Knight SA, Grandner MA, Killgore WDS. (2017, June 3-7) *Post-Concussion Severity is associated with Sleep Problems and Neuropsychological Status*. Poster session presented at: SLEEP 2017. 31st Annual Meeting of the Associated Professional Sleep Societies, Boston, MA.

Dailey, N.S., Bajaj, S., Smith, R., Alkozei, A., & Killgore, W. D. S. (2017, submitted). *Neural Correlates of Aggression during Chronic and Post-Acute Stages of Recover from Mild Traumatic Brain Injury*. Military Health Systems Research Symposium, Kissimmee, FL.

Dailey, N.S., Bajaj, S., Alkozei, A., Smith, R., Knight, S.A., & Killgore, W.D.S. (2017, August). Neural Correlates of Aggression in the Chronic and Post-Acute Stages of Recover from Mild Traumatic Brain Injury: A diffusion tensor imaging study. International Neuropsychological Society, Washington, D.C.

Raikes, A.C., & Killgore, W.D.S. (2017). *Increased cerebellar grey matter in the presence of decreased subjective sleep quality following mild traumatic brain injury*. Poster submitted for International Neuropsychological Society, Washington, D.C.

Raikes, A.C., Satterfield, B.C., Knight, S.A., & Killgore, W.D.S. (2017). *Grey matter volumetric differences with increasing numbers of previous mild traumatic brain injuries: A voxel-based-morphometric study*. Poster submitted for International Neuropsychological Society, Washington, D.C.

- **Manuscripts under review this year:**

Bajaj, S., Dailey, N. S., Alkozei, A., Rosso, I. M., Rauch, S. L., & Killgore, W. D. S. (in revision, 2017). Time-dependent differences in cortical measures and their associations with sleep measures following mild traumatic brain injury. Human Brain Mapping.

- **Manuscripts in preparation this year:**

Dailey, N.S., Bajaj, S., Alkozei, A., Smith, R., Gottschlich, M.K., Raikes, A.C., & Killgore, W. D. S. (in preparation, 2017). White matter integrity associated with elevated aggression in mild traumatic brain injury: A DTI study. Frontiers Behavioral Neuroscience.

- **Book Chapters Published this year:**

Klimova, A, Singh, P, & Killgore WDS. White matter abnormalities in MS: Advances in diffusion tensor imaging/tractography. In Watson, RR & Killgore, WD (Eds), Nutrition and Lifestyle in Neurological Autoimmune Diseases (2017), pp. 21-28.

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What individuals have worked on the project?

Name: William D. “Scott” Killgore, Ph.D.

Project Role: PI

Nearest person month worked: 2

Contribution to Project: Oversees all aspects of project progress and orchestrates data analysis and publication efforts.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062

USAMRAA W81XWH-12-1-0386

Name: Anna Alkozei, Ph.D.

Project Role: Postdoctoral Fellow

Nearest person month worked: 4

Contribution to Project: Dr. Alkozei performs data analysis and processing for the project.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Ryan Smith, Ph.D.

Project Role: Postdoctoral Fellow

Nearest person month worked: 4

Contribution to Project: Dr. Smith performs data analysis and processing for the project.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Natalie Dailey, Ph.D., CCC-SLP

Project Role: Postdoctoral Fellow

Nearest person month worked: 2

Contribution to Project: Dr. Dailey performs data analysis and processing for the project.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Sahil Bajaj, Ph.D.

Project Role: Postdoctoral Fellow

Nearest person month worked: 3

Contribution to Project: Dr. Bajaj performs data analysis and processing for the project.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Sara Knight

Project Role: Lab Manager

Nearest person month worked: 3

Contribution to Project: Ms. Knight oversees the administrative needs of the study and study staff, in addition to providing regulatory support and performing periodic quality control checks.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062

USAMRAA W81XWH-12-1-0386

Name: Matthew Allbright

Project Role: Research Technician

Nearest person month worked: 3

Contribution to Project: Mr. Allbright oversees the technical aspects of the project and assists in database export, storage, and management.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Sarah (Markowski) Berryhill

Project Role: Research Technician

Nearest person month worked: 2

Contribution to Project: Mrs. Berryhill provides support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Skye Challenger

Project Role: Research Technician

Nearest person month worked: 3

Contribution to Project: Ms. Challenger provided support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-12-1-0386

Name: Brittany Forbeck

Project Role: Research Technician

Nearest person month worked: 1

Contribution to Project: Ms. Forbeck provided support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-12-1-0386

Name: Andrew Fridman

Project Role: Research Technician

Nearest person month worked: 4

Contribution to Project: Mr. Fridman provides support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570

USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Melissa Gottschlich

Project Role: Research Technician

Nearest person month worked: 3

Contribution to Project: Ms. Gottschlich oversees project needs and manages day-to-day aspects of project operations.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-12-1-0386

Name: Simone Hyman

Project Role: Research Technician

Nearest person month worked: 2

Contribution to Project: Ms. Hyman provided support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Jacqueline Marquez

Project Role: Research Technician

Nearest person month worked: 3

Contribution to Project: Ms. Marquez provided support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Melissa Millan

Project Role: Research Technician

Nearest person month worked: 4

Contribution to Project: Ms. Millan oversaw project progress and managed the day-to-day needs of the project.

Funding support: USAMRAA W81XWH-14-1-0570
USAMRAA W81XWH-14-1-0571
USAMRAA W81XWH-16-1-0062
USAMRAA W81XWH-12-1-0386

Name: Anna Sanova

Project Role: Research Technician

Nearest person month worked: 3

Contribution to Project: Ms. Sanova provided support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570
 USAMRAA W81XWH-14-1-0571
 USAMRAA W81XWH-16-1-0062
 USAMRAA W81XWH-12-1-0386

Name: Anmol Singh

Project Role: Research Technician

Nearest person month worked: 3

Contribution to Project: Mr. Singh provided support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570
 USAMRAA W81XWH-14-1-0571
 USAMRAA W81XWH-16-1-0062
 USAMRAA W81XWH-12-1-0386

Name: Matthew Thurston

Project Role: Research Technician

Nearest person month worked: 1

Contribution to Project: Mr. Thurston provided support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570
 USAMRAA W81XWH-14-1-0571
 USAMRAA W81XWH-16-1-0062
 USAMRAA W81XWH-12-1-0386

Name: Wing Ka Angela Yung

Project Role: Research Technician

Nearest person month worked: 1

Contribution to Project: Ms. Yung provided support with data collection and recruitment activities.

Funding support: USAMRAA W81XWH-14-1-0570
 USAMRAA W81XWH-14-1-0571
 USAMRAA W81XWH-16-1-0062
 USAMRAA W81XWH-12-1-0386

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?

No change since last reporting period.

What other organizations were involved as partners?

Nothing to Report.

8. SPECIAL REPORTING REQUIREMENTS

Please see updated Quad Chart attached in Appendix.

CONCLUSION

The study continues to progress as planned. Recruitment continues to be slower than we would like, but the study is progressing forward at an adequate pace. Preliminary findings suggest that the data collection methods and procedures are effective and that valid data are continuing to be acquired. We have begun to submit manuscripts for publication based on our preliminary findings. We believe that we will soon have a large enough sample to begin more extensive and valid data analysis.

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APPENDICES

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William D. "Scott" Killgore, Ph.D. Curriculum Vitae.....	228-300

**A Model for Predicting Cognitive and Emotional Health from Structural and Functional
Neurocircuitry Following Traumatic Brain Injury
Study Tasks and Assessments**

Day of Scan Questionnaire

Epworth Sleepiness Scale (ESS)

OSU TBI Interview

Glasgow Outcome Scale – Extended (GOS-E)

MINI International Psychiatric Interview (MINI)

California Verbal Learning Test (CVLT)

Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)

Delis-Kaplan Executive Function System (D-KEFS)

Go/No Go

Brief Visual Memory Test-Revised (BVM-T-R)

Buss Perry Aggression Questionnaire (BPAQ)

Psychomotor Vigilance Test (PVT)

Pittsburgh Sleep Quality Index (PSQI)

State Trait Anxiety Inventory (STAI)

Automated Neuropsychological Assessment Metrics (ANAM)

Beck Depression Inventory (BDI-II)

Wechsler Abbreviated Scale of Intelligence (WASI II)

Connor- Davidson Resilience Scale (CD-RISC)

Craig Handicap Assessment and Reporting Technique Short Form (CHART-SF)

Personality Assessment Inventory (PAI)

Alcohol Use Disorder Identification Test (AUDIT)

Rivermead Post Concussion Symptoms Questionnaire (RPCSQ)

Snaith Hamilton Pleasure Scale (SHAPS)

Satisfaction With Life Scale (SWLS)

Edinburgh Handedness Survey (EHS)

Marijuana Use Questionnaire (MUSE)

A Model for Predicting Cognitive and Emotional Health from Structural and Functional Neurocircuitry following Traumatic Brain Injury

PT110814

W81XWH-12-1-0386

PI: William D. Killgore, Ph.D.

Org: University of Arizona

Award Amount: \$2,272,098



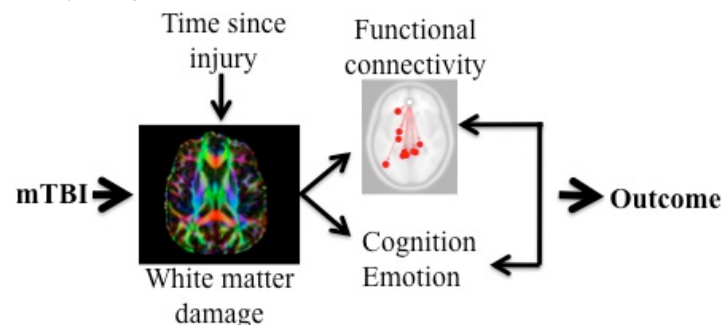
Study/Product Aim(s)

- Demonstrate the extent to which structural white matter damage explains abnormalities in cognition and emotion at different recovery stages following mild traumatic brain injury (TBI).
- Demonstrate the extent to which structural white matter damage explains abnormalities in functional connectivity at different recovery stages following mild TBI.
- Determine whether white matter disintegrity could serve as an objective marker for mild TBI.

Approach

Cross-sectional study involves comprehensive neuropsychiatric and neuropsychological assessment of 30 healthy controls and 150 individuals with mild TBI, of which 30 each will be assessed at 2 weeks, 1 month, 3 months, 6 months, and 12 month post-TBI. All participants undergo diffusion-weighted imaging, resting-state functional connectivity imaging, and neurocognitive assessment.

The study investigates whether and how white matter damage at 5 different natural recovery stages contributes to functional connectivity, cognition and emotion.



Accomplishments: Study is well underway after transferring from McLean Hospital to University of Arizona. 31 participants were collected at McLean, and 33 have been collected at University of Arizona. Data collection ahead of schedule and 1/3 complete.

Timeline and Cost

Activities	CY	13	14	15	16	17	18	19
Study preparations		■		■				
Data collection		■	■	■	■	■	■	■
Lab Relocation/Grant Move			■	■				
Data quality check				■	■	■	■	■
Data analysis/dissemination								■
Estimated Budget (\$2,272K)		\$188K	\$195K	\$420K	\$420K	\$420K	\$420K	\$209K

Goals/Milestones

CY14 Goal – Close study to enrolment and move lab to U of Arizona

☑ Completed move successfully. Funding transferred successfully

CY15 Goals – Complete preparations & launch study at UA

☑ Preparations, training, and MRI protocols successfully completed

☑ Study re-initiated in Arizona successfully!

☑ Preliminary findings published; several presentations submitted

CY16-18 Goal – Data collection, quality checks

☑ 62 Participants completed since relocation to UA; 93 participants have completed in total. Quarterly recruitment is on schedule.

☐ Collect data from approximately 60 subjects per CY

CY19 Goal – Data analysis and dissemination

☐ Conduct final data analyses and prepare data for publication

Comments/Challenges/Issues/Concerns

• None. The study is progressing on target.

Budget Expenditure to Date

Cumulative Expenditure: \$1,444,428

Updated: 15 OCT 2017

DAY OF SCAN INFORMATION QUESTIONNAIRE

SUBJECT #: _____

DATE: ____/____/____

AGE _____ years

HEIGHT _____ ft/inches

WEIGHT _____ lbs

SEX

☐ **MALE**

☐ **FEMALE**

For females only:

When was the start of your last menstrual period?

Be as precise as possible.

Date of period: _____

or about _____ days ago.

RIGHT or LEFT-HANDED?

☐ **RIGHT**

☐ **LEFT**

☐ **BOTH/NEITHER**

Do you have any problems with reading? ☐ **NO** ☐ **YES**

EDUCATION: What is the highest grade or level of school you have completed or the highest degree you have obtained? *Please choose one:*

- ☐ 9th Grade
- ☐ 10th Grade
- ☐ 11th Grade
- ☐ 12th Grade, no diploma
- ☐ High school graduate
- ☐ GED or equivalent
- ☐ Some college, no degree
- ☐ Associate degree: occupational, technical, or vocational program
- ☐ Associate degree: academic program
- ☐ Bachelor's degree (e.g., BA, AB, BS, BBA)
- ☐ Master's degree (e.g., MA, MS, MEng, MEd, MBA)
- ☐ Professional school degree (e.g., MD, DDS, DVM, JD)
- ☐ Doctoral degree (e.g., PhD, EdD)
- ☐ Unknown

RACE: With what ethnicity do you identify?

- ☐ White
- ☐ Hispanic/Latino
- ☐ Black/African American
- ☐ Native American/ American Indian
- ☐ Asian/Pacific Islander
- ☐ Other

Are you currently doing shift work (e.g., working early morning, evening, or night shifts)?

- ☐ **NO** ☐ **YES**

Do you engage in regular exercise?

- ☐ **NO** ☐ **YES**

Which sport? _____

How many days per week? _____

How many minutes per exercise session (on average)? _____

CAFFEINE USE

Did you have any caffeine containing products today?

☐ **NO** ☐ **YES** How much? _____

On average, how many cups (=8oz) of caffeinated coffee do you drink per day? _____

On average, how many cups (=8oz) of caffeinated tea do you drink per day? _____

On average, how many cans of caffeinated soda do you drink per day? _____

On average, how many caffeinated sports drinks do you drink per day? _____ (brand)

Do you use any other caffeinated products (e.g. Vivarin)?

☐ **NO** ☐ **YES** Brand? _____

How much? _____

How often? _____

NICOTINE AND OTHER SUBSTANCE USE

Do you currently smoke cigarettes?

☐ **NO** ☐ **YES**

How many? _____ daily / weekly / monthly / yearly (*circle one*)

For how long? _____ years _____ months

Have you tried to quit? ☐ **NO** ☐ **YES**

How many times? _____

Have you ever smoked cigarettes in the past?

☐ **NO** ☐ **YES**

How many? _____ daily / weekly / monthly / yearly (*circle one*)

For how long? _____ years _____ months

When did you quit? _____ (approximate date)

Do you currently smoke large cigars?

☐ **NO** ☐ **YES**

How many? _____ daily / weekly / monthly/ yearly (*circle one*)

For how long? _____ years _____ months

Have you tried to quit? ☐ **NO** ☐ **YES**

How many times? _____

Have you ever smoked large cigars in the past?

☐ **NO** ☐ **YES**

How many? _____ daily / weekly / monthly / yearly (*circle one*)

For how long? _____ years _____ months

When did you quit? _____ (approximate date)

Do you currently smoke small cigars?

☐ **NO** ☐ **YES**

How many? _____ daily / weekly / monthly/ yearly (*circle one*)

For how long? _____ years _____ months

Have you tried to quit? ☐ **NO** ☐ **YES**

How many times? _____

Have you ever smoked small cigars in the past?

☐ **NO** ☐ **YES**

How many? _____ daily / weekly / monthly / yearly (*circle one*)

For how long? _____ years _____ months

When did you quit? _____ (approximate date)

Do you currently smoke cigarillos?

☐ **NO** ☐ **YES**

How many? _____ daily / weekly / monthly/ yearly (*circle one*)

For how long? _____ years _____ months

Have you tried to quit? ☐ **NO** ☐ **YES**

How many times? _____

Have you ever smoked cigarillos in the past?

☐ **NO** ☐ **YES**

How many? _____ daily / weekly / monthly / yearly (*circle one*)

For how long? _____ years _____ months

When did you quit? _____ (approximate date)

Do you currently use smokeless tobacco, such as dip or chew?

☐ **NO**

☐ **YES**

About how much/ many? _____ daily / weekly / monthly / yearly (*circle one*)

For how long? _____ years _____ months

Have you tried to quit? ☐ **NO** ☐ **YES**

How many times? _____

Have you ever used smokeless tobacco in the past?

☐ **NO**

☐ **YES**

About how much/ many? _____ daily / weekly / monthly / yearly (*circle one*)

For how long? _____ years _____ months

When did you quit? _____ (approximate date)

Do you currently use any other nicotine-containing products?

☐ **NO**

☐ **YES**

Which kind? _____

For how long? _____ years _____ months

How often? _____ daily/ weekly/ monthly/ yearly (*circle one*)

Have you tried to quit? ☐ **NO** ☐ **YES**

How many times? _____

Have you ever used any other kind of nicotine containing products?

☐ **NO**

☐ **YES**

Which kind? _____

For how long? _____ years _____ months

How often? _____ daily/ weekly/ monthly/ yearly (*circle one*)

Have you tried to quit? ☐ **NO** ☐ **YES**

How many times? _____

Are you currently taking diet pills?

☐ **NO**

☐ **YES**

What brand? _____

For how long? _____ years _____ months _____ days

How much? _____

How often? _____ daily / weekly / monthly / yearly (*circle one*)

Are you currently taking any medications, vitamins, or supplements?

☐ **NO**

☐ **YES**

Please list:

Name: _____

Dosage: _____

Name: _____

Dosage: _____

Name: _____

Dosage: _____

Name: _____

Dosage: _____

Have you ever used any street drugs?

☐ **NO**

☐ **YES**

What? _____

How much? _____

How often? _____ daily/ weekly/ monthly/ yearly (*circle one*)

In the past year, did you use any other street drugs?

☐ **NO** ☐ **YES**

What? _____

How much? _____

How often? _____ daily/ weekly/ monthly/ yearly (*circle one*)

Do you currently use any other street drugs?

☐ **NO**

☐ **YES**

What? _____

How much? _____

How often? _____ daily/ weekly/ monthly/ yearly (*circle one*)

Do you drink alcohol?

☐ **NO**

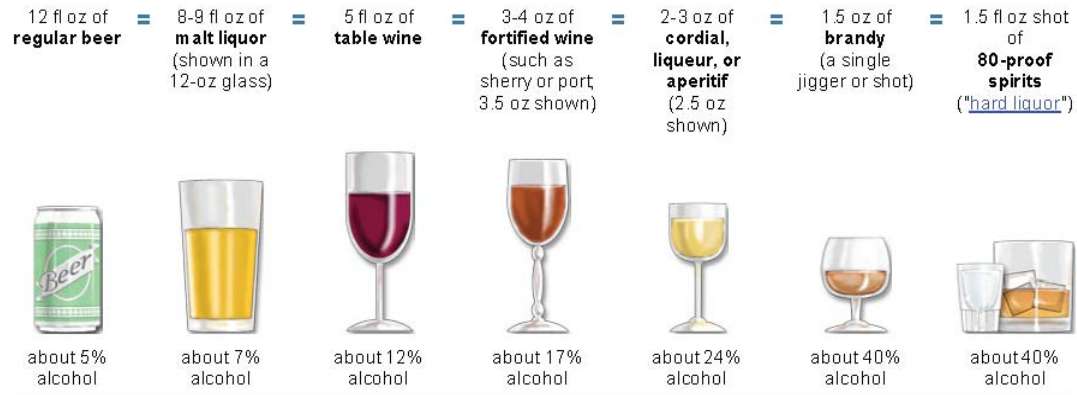
☐ **YES**

How many times per month? _____

Using the below chart, what is the average number of drinks you consume on these occasions? _____

Using the chart, what is the largest number of drinks you consume? _____

One drink equals:



INFORMATION ON THE MOST RECENT DOCUMENTED INJURY

[illegible]

What happened? _____

Did you experience any symptoms or changes after the injury?

- ☐ NO ☐ YES, IMMEDIATELY AFTER THE INJURY
☐ YES, NOT IMMEDIATELY AFTER THE INJURY

Which symptoms or changes did you experience?

At the time of the injury, were you under the influence of alcohol, medication or drugs at that time?

- ☐ **NO**
- ☐ **YES, ALCOHOL**
- ☐ **YES, MEDICATION** (which?) _____
- ☐ **YES, DRUGS** (which?) _____

Were medical services received after injury?

- ☐
- NO
- ☐
- DO NOT KNOW
- ☐
- YES

Did you “see stars” during your last concussion?

- ☐
- NO
- ☐
- DO NOT KNOW
- ☐
- YES

Did you experience loss of consciousness?

☐ **NO** ☐ **DO NOT KNOW** ☐ **YES**

Duration of loss of consciousness:

- ☐ <1 minute
- ☐ 1-29 minutes
- ☐ 30-59 minutes
- ☐ 1-24 hours
- ☐ 1-7 days
- ☐ > 7 days
- ☐ Unknown

How was the loss of consciousness verified?

☐ **Self-report** ☐ **Witness** ☐ **Medical chart**

Do you have a PERSONAL memory of the event/ incident itself?

☐ **YES, I FULLY REMEMBER** ☐ **YES, BUT THERE ARE GAPS IN MY MEMORY**
☐ **NO, I DO NOT REMEMBER AT ALL**

How much do you NOT remember after the injury?

- ☐ <1 minute
- ☐ 1-29 minutes
- ☐ 30-59 minutes
- ☐ 1-24 hours
- ☐ 1-7 days
- ☐ > 7 days
- ☐ Unknown

How was the memory loss verified?

☐ **Self-report** ☐ **Witness** ☐ **Medical chart**

After the injury, when did you feel back to yourself or 100%? Please state the approximate number of days. _____

How many separate injuries do you think have you sustained in total? _____

How many of these were documented by a health professional, athletic trainer, coach, etc.? _____

SLEEP HABITS

How much sleep did you get last night? _____ HRS

Before your injury, what time did you typically awaken on:

Weekdays (Mon-Fri)? _____ AM PM (midnight = 12 AM; noon = 12 PM)

Weekends (Sat-Sun)? _____ AM PM

Before your injury, how long did it typically take you to fall asleep at night?

Week nights (Sun-Thur) _____ MIN HRS (midnight = 12 AM; noon = 12 PM)

Weekends (Fri-Sat) _____ MIN HRS

Before your injury, at what time did you normally go to bed at night on:

Week nights (Sun-Thur)? _____ AM PM (midnight = 12 AM; noon = 12 PM)

Weekends (Fri-Sat)? _____ AM PM

Before the injury, did you experience sleep problems?

☐ **NO** ☐ **YES, I had trouble falling asleep.**

How often? _____ times per WEEK MONTH YEAR

☐ **YES, I had trouble staying asleep.**

How often? _____ times per WEEK MONTH YEAR

Since the injury, did you notice that your sleep became worse?

☐ **NO** ☐ **YES**

What sleep problems became more noticeable to you? (check all that apply)

☐ I get sleepier during the day.

☐ I get drowsier than I used to when trying to concentrate or work.

☐ I fall asleep when I should not.

☐ It is harder to stay alert during the day.

☐ It is harder to fall asleep at night.

How often? _____ times per WEEK MONTH YEAR (*circle one*)

☐ I fall asleep much later than I used to.

- ☐ I fall asleep much earlier than I used to.
- ☐ I sleep later in the morning than I used to.
- ☐ I have trouble staying asleep.

How often? _____ times per WEEK MONTH YEAR (circle one)

- ☐ I wake up much earlier in the morning than I used to.
- ☐ When I do sleep, it is fitful or less restful than it used to be.
- ☐ I wake up off and on throughout the night more than I used to.
- ☐ I have more nightmares than I used to.

Since your injury, how much do you typically sleep on weeknights (Sun-Thur)? _____ HRS

Since your injury, how much do you typically sleep on weekend nights (Fri-Sat)? _____ HRS

Since your injury, at what time do you normally go to bed at night on:

Week nights (Sun-Thur)? _____ AM PM (midnight = 12 AM; noon = 12 PM)

Weekends (Fri-Sat)? _____ AM PM

Since your injury, what time do you typically awaken on:

Weekdays (Mon-Fri)? _____ AM PM

Weekends (Sat-Sun)? _____ AM PM

Since your injury, how long does it typically take you to fall asleep at night?

Week nights (Sun-Thur)? _____ MIN HRS

Weekends (Fri-Sat)? _____ MIN HRS

Since your injury,

at what time of day do you feel sleepiest? _____ AM PM

at what time of day do you feel most alert? _____ AM PM

how many hours do you need to sleep to feel your best? _____

if you get less than _____ hours of sleep, you notice impairment in your ability to function at work.

if you get more than _____ hours of sleep, you notice impairment in your ability to function at work.

Since your injury, do you take more than two daytime naps per month?

☐ **NO** ☐ **YES**

How many times per week do you nap? _____

At what time? ____:____ AM/PM to ____:____AM/PM

Do you consider yourself a light, normal, or heavy sleeper?

☐ **LIGHT** ☐ **NORMAL** ☐ **HEAVY**

Have you been told or do you think that you snore excessively?

☐ **NO** ☐ **YES**

Have you ever been diagnosed or treated for sleep apnea or sleep disordered breathing?

☐ **NO** ☐ **YES**

Is daytime sleepiness currently a problem for you?

☐ **NO** ☐ **YES**

Epworth Sleepiness Scale

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired?

This refers to your **usual way of life in recent times**. Even if you have not done some of these things recently try to work out how they would have affected you. Use the following scale to choose the most appropriate number for each situation:

0 = would never doze

1 = slight chance of dozing

2 = moderate chance of dozing

3 = high chance of dozing

SITUATION	CHANCE OF DOZING			
Sitting and reading	0	1	2	3
Watching TV	0	1	2	3
Sitting, inactive in a public place (e.g. a theater or meeting)	0	1	2	3
As a passenger in a car for an hour without a break	0	1	2	3
Lying down to rest in the afternoon when circumstances permit	0	1	2	3
Sitting and talking to someone	0	1	2	3
Sitting quietly after a lunch without alcohol	0	1	2	3
In a car, while stopped for a few minutes in the traffic	0	1	2	3

Ohio State University TBI Identification Method Short Form*

I would like to ask you about injuries to your head or neck that you may have had at anytime in your life.

Interviewer instruction: Record cause and any details provided spontaneously in the box at the bottom of the page. DO NOT query further about LOC or other details at this stage.

1. Have you ever been hospitalized or treated in an emergency room following an injury to your head or neck? Think about any childhood injuries you remember or were told about.
☐ Yes—Record cause(s) in table below
☐ No
2. Have you ever injured your head or neck in a car accident or from some other moving vehicle accident (e.g. motorcycle, ATV)?
☐ Yes—Record cause(s) in table below
☐ No
3. Have you ever injured your head or neck in a fall or from being hit by something (e.g. falling from a bike, horse, or rollerblades, falling on ice, being hit by a rock)? Have you ever injured your head or neck playing sports or on the playground?
☐ Yes—Record cause(s) in table below
☐ No
4. Have you ever injured your head or neck in a fight, from being hit by someone, or from being shaken violently? Have you ever been shot in the head?
☐ Yes—Record cause(s) in table below
☐ No
5. Have you ever been nearby when an explosion or a blast occurred? If you served in the military, think about any combat- or training-related incidents.
☐ Yes—Record cause(s) in table below
☐ No
6. If all above are “no” then proceed to question 7. If answered “yes” to *any* of the questions above, ask the following for each injury: **Were you knocked or did you lose consciousness (LOC)? If yes, how long? If no, were you dazed or did you have a gap in your memory from the injury? How old were you? (age is only needed if there was LOC)**

[illegible]

* adapted with permission from the Ohio State University TBI Identification Method (Corrigan, J.D., Bogner, J.A. (2007). Initial reliability and validity of the OSU TBI Identification Method. *J Head Trauma Rehabil*, 22(6):318-329,

If more injuries with LOC: How many more? ____ Longest knocked out? ____ How many ≥ 30 mins.? ____ Youngest age? ____

7. Have you ever lost consciousness from a drug overdose or being choked? ____# overdose ____# choked

SCORING

_____ # **TBI-LOC** (number of TBI's with loss of consciousness from #6a)

_____ # **TBI-LOC ≥ 30** (number of TBI's with loss of consciousness ≥ 30 minutes from #6a)

_____ **age at first TBI-LOC** (youngest age from #6a)

_____ **TBI-LOC before age 15** (if youngest age from #7B < 15 then =1, if ≥ 15 then = 0)

_____ **Worst Injury** (1-5):

If responses to #1-5 are "no" classify as 1 "improbable TBI".

If in response to #6a and 6b reports never having LOC, being dazed or having memory lapses classify as 1 "improbable TBI".

If in response to #6b reports being dazed or having a memory lapse classify as 2 "possible TBI".

If in response to #6a loss of consciousness (LOC) does not exceed 30 minutes for any injury classify as 3 "mild TBI".

If in response to #6a LOC for any one injury is between 30 minutes and 24 hours classify as 4 "moderate TBI".

If in response to #6a LOC for any one injury exceeds 24 hours classify as 5 "severe TBI".

_____ # **anoxic injuries** (sum of incidents reported in #7)

Subject ID: _____

Date: _____

Glasgow Outcome Scale – Extended

CONSCIOUSNESS			
1.	Is the subject able to obey simple commands, or say words?	NO	YES
INDEPENDENCE IN THE HOME			
2.a	Is assistance of another person at home essential every day for some activities of daily living?	NO	YES
	Notes.		
2.b	Do you need frequent help or someone to be around at home most of the time?	NO <i>(UPPER SD)</i>	YES <i>(LOWER SD)</i>
2.c	Was assistance at home essential before the injury?	NO	YES
	Notes.		
INDEPENDENCE OUTSIDE OF HOME			
3.a	Do you shop without assistance?	NO <i>(UPPER SD)</i>	YES
3.b	Did you need assistance before the injury?	NO	YES
	Notes.		
4.a	Do you travel without assistance?	NO <i>(UPPER SD)</i>	YES
4.b	Did you need assistance before the injury?	NO	YES
	Notes.		

Subject ID: _____

Date: _____

WORK				
5.a	Are you currently working to your previous capacity?	NO		YES
5.b	How restricted are you?	Reduced work capacity. (UPPER MD)		Able to work in sheltered workshop or non-competitive job, or unable to work (LOWER MD)
5.c	Have you been working or seeking employment before the injury?	NO		YES
	Notes.			
SOCIAL & LEISURE ACTIVITIES				
6.a	Are you able to resume regular social and leisure activities outside home?	NO		YES
6.b	What is the extent of the restriction?	Participate a bit less: at least half as often as before injury (LOWER GR)	Participate much less: less than half as often (UPPER MD)	Unable to participate: rarely, if ever (LOWER MD)
6.c	Did you engage in regular social and leisure activities before the injury?	NO		YES
	Notes.			
FAMILY & FRIENDSHIPS				
7.a	Have there been any psychological problems which have resulted in ongoing family disruption or disruption of friendship?	NO		YES

Subject ID: _____

Date: _____

7.b	What is the extent of disruption or strain?	Occasional: less than weekly	Frequent: once a week or more, but tolerable	Constant: daily and intolerable
7.c	Were there problems with family or friends before the injury?	NO		YES
	Notes.			
RETURN TO NORMAL LIFE				
8.a	Are there any other current problems relating to the injury which affect daily life?	NO (UPPER GR)		YES (LOWER GR)
8.b	Were similar problems present before injury?	NO		YES
	Notes.			

SCORING		
1	Dead	
2	Vegetative State	VS
3	Lower Severe Disability	Lower SD
4	Upper Severe Disability	Upper SD
5	Lower Moderate Disability	Lower MD
6	Upper Moderate Disability	Upper MD
7	Lower Good Recovery	Lower GR
8	Upper Good Recovery	Upper GR

M.I.N.I.

MINI INTERNATIONAL NEUROPSYCHIATRIC INTERVIEW

English Version 6.0.0

DSM-IV

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DISCLAIMER

Our aim is to assist in the assessment and tracking of patients with greater efficiency and accuracy. Before action is taken on any data collected and processed by this program, it should be reviewed and interpreted by a licensed clinician.

This program is not designed or intended to be used in the place of a full medical and psychiatric evaluation by a qualified licensed physician – psychiatrist. It is intended only as a tool to facilitate accurate data collection and processing of symptoms elicited by trained personnel.

	Patient Number:
	Time Interview Began:
Interviewer's Name:	Time Interview Ended:
Date of Interview:	Total Time:

MODULES	TIME FRAME	MEETS CRITERIA	DSM-IV-TR	ICD-10	PRIMARY DIAGNOSIS
A MAJOR DEPRESSIVE EPISODE	Current (2 weeks)	<input type="checkbox"/>	296.20-296.26 Single	F32.x	<input type="checkbox"/>
	Past	<input type="checkbox"/>	296.20-296.26 Single	F32.x	<input type="checkbox"/>
	Recurrent	<input type="checkbox"/>	296.30-296.36 Recurrent	F33.x	<input type="checkbox"/>
B SUICIDALITY	Current (Past Month) <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High	<input type="checkbox"/>			
C MANIC EPISODE	Current	<input type="checkbox"/>	296.00-296.06	F30.x-F31.9	<input type="checkbox"/>
	Past	<input type="checkbox"/>			
HYPOMANIC EPISODE	Current	<input type="checkbox"/>	296.80-296.89	F31.8-F31.9/F34.0	<input type="checkbox"/>
	Past	<input type="checkbox"/>			
BIPOLAR I DISORDER	Current	<input type="checkbox"/>	296.0x-296.6x	F30.x-F31.9	<input type="checkbox"/>
	Past	<input type="checkbox"/>	296.0x-296.6x	F30.x-F31.9	<input type="checkbox"/>
BIPOLAR II DISORDER	Current	<input type="checkbox"/>	296.89	F31.8	<input type="checkbox"/>
	Past	<input type="checkbox"/>	296.89	F31.8	<input type="checkbox"/>
BIPOLAR DISORDER NOS	Current	<input type="checkbox"/>	296.80	F31.9	<input type="checkbox"/>
	Past	<input type="checkbox"/>	296.80	F31.9	<input type="checkbox"/>
D PANIC DISORDER	Current (Past Month)	<input type="checkbox"/>	300.01/300.21	F40.01-F41.0	<input type="checkbox"/>
	Lifetime	<input type="checkbox"/>			
E AGORAPHOBIA	Current	<input type="checkbox"/>	300.22	F40.00	<input type="checkbox"/>
F SOCIAL PHOBIA (Social Anxiety Disorder)	Current (Past Month)				
	Generalized	<input type="checkbox"/>	300.23	F40.1	<input type="checkbox"/>
	Non-Generalized	<input type="checkbox"/>	300.23	F40.1	<input type="checkbox"/>
G OBSESSIVE-COMPULSIVE DISORDER	Current (Past Month)	<input type="checkbox"/>	300.3	F42.8	<input type="checkbox"/>
H POSTTRAUMATIC STRESS DISORDER	Current (Past Month)	<input type="checkbox"/>	309.81	F43.1	<input type="checkbox"/>
I ALCOHOL DEPENDENCE	Past 12 Months	<input type="checkbox"/>	303.9	F10.2x	<input type="checkbox"/>
ALCOHOL ABUSE	Past 12 Months	<input type="checkbox"/>	305.00	F10.1	<input type="checkbox"/>
J SUBSTANCE DEPENDENCE (Non-alcohol)	Past 12 Months	<input type="checkbox"/>	304.00-.90/305.20-.90	F11.1-F19.1	<input type="checkbox"/>
SUBSTANCE ABUSE (Non-alcohol)	Past 12 Months	<input type="checkbox"/>	304.00-.90/305.20-.90	F11.1-F19.1	<input type="checkbox"/>
K PSYCHOTIC DISORDERS	Lifetime	<input type="checkbox"/>	295.10-295.90/297.1/	F20.xx-F29	<input type="checkbox"/>
	Current	<input type="checkbox"/>	297.3/293.81/293.82/		
			293.89/298.8/298.9		
MOOD DISORDER WITH	Lifetime	<input type="checkbox"/>	296.24/296.34/296.44	F32.3/F33.3/	<input type="checkbox"/>
PSYCHOTIC FEATURES	Current	<input type="checkbox"/>	296.24/296.34/296.44	F30.2/F31.2/F31.5	<input type="checkbox"/>
				F31.8/F31.9/F39	<input type="checkbox"/>
L ANOREXIA NERVOSA	Current (Past 3 Months)	<input type="checkbox"/>	307.1	F50.0	<input type="checkbox"/>
M BULIMIA NERVOSA	Current (Past 3 Months)	<input type="checkbox"/>	307.51	F50.2	<input type="checkbox"/>
ANOREXIA NERVOSA, BINGE EATING/PURGING TYPE	Current	<input type="checkbox"/>	307.1	F50.0	<input type="checkbox"/>
N GENERALIZED ANXIETY DISORDER	Current (Past 6 Months)	<input type="checkbox"/>	300.02	F41.1	<input type="checkbox"/>
O MEDICAL, ORGANIC, DRUG CAUSE RULED OUT		<input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> Uncertain			
P ANTISOCIAL PERSONALITY DISORDER	Lifetime	<input type="checkbox"/>	301.7	F60.2	<input type="checkbox"/>

IDENTIFY THE PRIMARY DIAGNOSIS BY CHECKING THE APPROPRIATE CHECK BOX.

(Which problem troubles you the most or dominates the others or came first in the natural history?)



The translation from DSM-IV-TR to ICD-10 coding is not always exact. For more information on this topic see Schulte-Markwort. Crosswalks ICD-10/DSM-IV-TR. Hogrefe & Huber Publishers 2006.

GENERAL INSTRUCTIONS

The M.I.N.I. was designed as a brief structured interview for the major Axis I psychiatric disorders in DSM-IV and ICD-10. Validation and reliability studies have been done comparing the M.I.N.I. to the SCID-P for DSM-III-R and the CIDI (a structured interview developed by the World Health Organization). The results of these studies show that the M.I.N.I. has similar reliability and validity properties, but can be administered in a much shorter period of time (mean 18.7 ± 11.6 minutes, median 15 minutes) than the above referenced instruments. It can be used by clinicians, after a brief training session. Lay interviewers require more extensive training.

INTERVIEW:

In order to keep the interview as brief as possible, inform the patient that you will conduct a clinical interview that is more structured than usual, with very precise questions about psychological problems which require a yes or no answer.

GENERAL FORMAT:

The M.I.N.I. is divided into **modules** identified by letters, each corresponding to a diagnostic category.

- At the beginning of each diagnostic module (except for psychotic disorders module), screening question(s) corresponding to the main criteria of the disorder are presented in a **gray box**.
- At the end of each module, diagnostic box(es) permit the clinician to indicate whether diagnostic criteria are met.

CONVENTIONS:

Sentences written in « normal font » should be read exactly as written to the patient in order to standardize the assessment of diagnostic criteria.

Sentences written in « CAPITALS » should not be read to the patient. They are instructions for the interviewer to assist in the scoring of the diagnostic algorithms.

Sentences written in « bold » indicate the time frame being investigated. The interviewer should read them as often as necessary. Only symptoms occurring during the time frame indicated should be considered in scoring the responses.

Answers with an arrow above them (➡) indicate that one of the criteria necessary for the diagnosis(es) is not met. In this case, the interviewer should go to the end of the module, circle « **NO** » in all the diagnostic boxes and move to the next module.

When terms are separated by a *slash (/)* the interviewer should read only those symptoms known to be present in the patient (for example, question G6).

Phrases in (parentheses) are clinical examples of the symptom. These may be read to the patient to clarify the question.

RATING INSTRUCTIONS:

All questions must be rated. The rating is done at the right of each question by circling either Yes or No. Clinical judgment by the rater should be used in coding the responses. Interviewers need to be sensitive to the diversity of cultural beliefs in their administration of questions and rating of responses. The rater should ask for examples when necessary, to ensure accurate coding. The patient should be encouraged to ask for clarification on any question that is not absolutely clear.

The clinician should be sure that each dimension of the question is taken into account by the patient (for example, time frame, frequency, severity, and/or alternatives).

Symptoms better accounted for by an organic cause or by the use of alcohol or drugs should not be coded positive in the M.I.N.I. The M.I.N.I. Plus has questions that investigate these issues.

For any questions, suggestions, need for a training session or information about updates of the M.I.N.I., please contact:

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A. MAJOR DEPRESSIVE EPISODE

(➡ MEANS : GO TO THE DIAGNOSTIC BOXES, CIRCLE **NO** IN ALL DIAGNOSTIC BOXES, AND MOVE TO THE NEXT MODULE)

A1	a	Were you <u>ever</u> depressed or down, most of the day, nearly every day, for two weeks?	NO	YES
IF NO, CODE NO TO A1b : IF YES ASK:				
	b	For the <u>past two weeks</u> , were you depressed or down, most of the day, nearly every day?	NO	YES
A2	a	Were you <u>ever</u> much less interested in most things or much less able to enjoy the things you used to enjoy most of the time, for two weeks?	NO	YES
IF NO, CODE NO TO A2b : IF YES ASK:				
	b	In the <u>past two weeks</u> , were you much less interested in most things or much less able to enjoy the things you used to enjoy, most of the time?	NO	YES
IS A1a OR A2a CODED YES?			➡ NO	YES

A3 IF **A1b** OR **A2b** = **YES**: EXPLORE THE **CURRENT** AND THE MOST SYMPTOMATIC **PAST** EPISODE, OTHERWISE
IF **A1b** AND **A2b** = **NO**: EXPLORE ONLY THE MOST SYMPTOMATIC **PAST** EPISODE

Over that two week period, when you felt depressed or uninterested:

		Past 2 Weeks		Past Episode	
a	Was your appetite decreased or increased nearly every day? Did your weight decrease or increase without trying intentionally (i.e., by $\pm 5\%$ of body weight or ± 8 lbs. or ± 3.5 kgs., for a 160 lb./70 kg. person in a month)? <small>IF YES TO EITHER, CODE YES.</small>	NO	YES	NO	YES
b	Did you have trouble sleeping nearly every night (difficulty falling asleep, waking up in the middle of the night, early morning wakening or sleeping excessively)?	NO	YES	NO	YES
c	Did you talk or move more slowly than normal or were you fidgety, restless or having trouble sitting still almost every day?	NO	YES	NO	YES
d	Did you feel tired or without energy almost every day?	NO	YES	NO	YES
e	Did you feel worthless or guilty almost every day? <small>IF YES, ASK FOR EXAMPLES. THE EXAMPLES ARE CONSISTENT WITH A DELUSIONAL IDEA. Current Episode <input type="checkbox"/> No <input type="checkbox"/> Yes Past Episode <input type="checkbox"/> No <input type="checkbox"/> Yes</small>	NO	YES	NO	YES
f	Did you have difficulty concentrating or making decisions almost every day?	NO	YES	NO	YES
g	Did you repeatedly consider hurting yourself, feel suicidal, or wish that you were dead? Did you attempt suicide or plan a suicide? <small>IF YES TO EITHER, CODE YES.</small>	NO	YES	NO	YES
A4	Did these symptoms cause significant problems at home, at work, socially, at school or in some other important way?	NO	YES	NO	YES
A5	In between 2 episodes of depression, did you ever have an interval of at least 2 months, without any significant depression or any significant loss of interest?			NO	YES

ARE **5** OR MORE ANSWERS (**A1-A3**) CODED **YES** AND IS **A4** CODED YES FOR THAT TIME FRAME?

SPECIFY IF THE EPISODE IS CURRENT AND / OR PAST.

IF **A5** IS CODED **YES**, CODE **YES** FOR RECURRENT.

NO	YES
MAJOR DEPRESSIVE EPISODE	
CURRENT	<input type="checkbox"/>
PAST	<input type="checkbox"/>
RECURRENT	<input type="checkbox"/>

A6 a How many episodes of depression did you have in your lifetime? _____

Between each episode there must be at least 2 months without any significant depression.

B. SUICIDALITY

Points

In the past month did you:

B1	Suffer any accident? IF NO TO B1, SKIP TO B2; IF YES, ASK B1a:	NO	YES	0
B1a	Plan or intend to hurt yourself in that accident either actively or passively (e.g. not avoiding a risk)? IF NO TO B1a, SKIP TO B2: IF YES, ASK B1b:	NO	YES	0
B1b	Intend to die as a result of this accident?	NO	YES	0
B2	Feel hopeless?	NO	YES	1
B3	Think that you would be better off dead or wish you were dead?	NO	YES	1
B4	Want to harm yourself or to hurt or to injure yourself or have mental images of harming yourself?	NO	YES	2
B5	Think about suicide? IF NO TO B5, SKIP TO B7. OTHERWISE ASK:	NO	YES	6

Frequency

Intensity

Occasionally	<input type="checkbox"/>	Mild	<input type="checkbox"/>
Often	<input type="checkbox"/>	Moderate	<input type="checkbox"/>
Very often	<input type="checkbox"/>	Severe	<input type="checkbox"/>

	Can you state that you will not act on these impulses during this treatment program?	NO	YES	
B6	Feel unable to control these impulses?	NO	YES	8
B7	Have a suicide plan?	NO	YES	8
B8	Take any active steps to prepare to injure yourself or to prepare for a suicide attempt in which you expected or intended to die?	NO	YES	9
B9	Deliberately injure yourself without intending to kill yourself?	NO	YES	4
B10	Attempt suicide? IF NO SKIP TO B11: Hope to be rescued / survive <input type="checkbox"/> Expected / intended to die <input type="checkbox"/>	NO	YES	9

In your lifetime:

B11	Did you ever make a suicide attempt?	NO	YES	4
-----	--------------------------------------	----	-----	---

IS AT LEAST **1** OF THE ABOVE (EXCEPT B1) CODED **YES**?

IF YES, ADD THE TOTAL POINTS FOR THE ANSWERS (B1-B11)
CHECKED 'YES' AND SPECIFY THE SUICIDALITY SCORE AS
INDICATED IN THE DIAGNOSTIC BOX:

MAKE ANY ADDITIONAL COMMENTS ABOUT YOUR ASSESSMENT
OF THIS PATIENT'S CURRENT AND NEAR FUTURE SUICIDALITY IN
THE SPACE BELOW:

NO

YES

***SUICIDALITY
CURRENT***

1-8 points	Low	<input type="checkbox"/>
9-16 points	Moderate	<input type="checkbox"/>
≥ 17 points	High	<input type="checkbox"/>

C. MANIC AND HYPOMANIC EPISODES

(➡ MEANS : GO TO THE DIAGNOSTIC BOXES, CIRCLE NO IN MANIC AND HYPOMANIC DIAGNOSTIC BOXES, AND MOVE TO NEXT MODULE)

Do you have any family history of manic depressive illness or bipolar disorder, or any family member who had mood swings treated with a medication like lithium, sodium valproate (Depakote) or lamotrigine (Lamictal)?

NO

YES

THIS QUESTION IS NOT A CRITERION FOR BIPOLAR DISORDER, BUT IS ASKED TO INCREASE THE CLINICIAN'S VIGILANCE ABOUT THE RISK FOR BIPOLAR DISORDER.

IF YES, PLEASE SPECIFY WHO: _____

- C1 a Have you **ever** had a period of time when you were feeling 'up' or 'high' or 'hyper' or so full of energy or full of yourself that you got into trouble, - or that other people thought you were not your usual self? (Do not consider times when you were intoxicated on drugs or alcohol.)

NO

YES

IF PATIENT IS PUZZLED OR UNCLEAR ABOUT WHAT YOU MEAN

BY 'UP' OR 'HIGH' OR 'HYPER', CLARIFY AS FOLLOWS: By 'up' or 'high' or 'hyper'

I mean: having elated mood; increased energy; needing less sleep; having rapid thoughts; being full of ideas; having an increase in productivity, motivation, creativity, or impulsive behavior; phoning or working excessively or spending more money.

IF NO, CODE NO TO C1b: IF YES ASK:

- b Are you currently feeling 'up' or 'high' or 'hyper' or full of energy?

NO

YES

- C2 a Have you **ever** been persistently irritable, for several days, so that you had arguments or verbal or physical fights, or shouted at people outside your family? Have you or others noticed that you have been more irritable or over reacted, compared to other people, even in situations that you felt were justified?

NO

YES

IF NO, CODE NO TO C2b: IF YES ASK:

- b Are you currently feeling persistently irritable?

NO

YES

IS C1a OR C2a CODED YES?

➡

NO

YES

- C3 IF C1b OR C2b = YES: EXPLORE THE **CURRENT** AND THE MOST SYMPTOMATIC **PAST** EPISODE, OTHERWISE
IF C1b AND C2b = NO: EXPLORE ONLY THE MOST SYMPTOMATIC **PAST** EPISODE

During the times when you felt high, full of energy, or irritable did you:

	<u>Current Episode</u>		<u>Past Episode</u>	
a Feel that you could do things others couldn't do, or that you were an especially important person? If YES, ASK FOR EXAMPLES. THE EXAMPLES ARE CONSISTENT WITH A DELUSIONAL IDEA. Current Episode <input type="checkbox"/> No <input type="checkbox"/> Yes Past Episode <input type="checkbox"/> No <input type="checkbox"/> Yes	NO	YES	NO	YES
b Need less sleep (for example, feel rested after only a few hours sleep)?	NO	YES	NO	YES
c Talk too much without stopping, or so fast that people had difficulty understanding?	NO	YES	NO	YES
d Have racing thoughts?	NO	YES	NO	YES

	Current Episode		Past Episode	
e Become easily distracted so that any little interruption could distract you?	NO	YES	NO	YES
f Have a significant increase in your activity or drive, at work, at school, socially or sexually or did you become physically or mentally restless?	NO	YES	NO	YES
g Want so much to engage in pleasurable activities that you ignored the risks or consequences (for example, spending sprees, reckless driving, or sexual indiscretions)?	NO	YES	NO	YES
C3 SUMMARY: WHEN RATING CURRENT EPISODE: IF C1b IS NO, ARE 4 OR MORE C3 ANSWERS CODED YES? IF C1b IS YES, ARE 3 OR MORE C3 ANSWERS CODED YES?	NO	YES	NO	YES
WHEN RATING PAST EPISODE: IF C1a IS NO, ARE 4 OR MORE C3 ANSWERS CODED YES? IF C1a IS YES, ARE 3 OR MORE C3 ANSWERS CODED YES? CODE YES ONLY IF THE ABOVE 3 OR 4 SYMPTOMS OCCURRED DURING THE SAME TIME PERIOD. RULE: ELATION/EXPANSIVENESS REQUIRES ONLY THREE C3 SYMPTOMS, WHILE IRRITABLE MOOD ALONE REQUIRES 4 OF THE C3 SYMPTOMS.				
C4 What is the longest time these symptoms lasted?				
a) 3 days or less		<input type="checkbox"/>		<input type="checkbox"/>
b) 4 to 6 days		<input type="checkbox"/>		<input type="checkbox"/>
c) 7 days or more		<input type="checkbox"/>		<input type="checkbox"/>
C5 Were you hospitalized for these problems?	NO	YES	NO	YES
IF YES, STOP HERE AND CIRCLE YES IN MANIC EPISODE FOR THAT TIME FRAME.				
C6 Did these symptoms cause significant problems at home, at work, socially in your relationships with others, at school or in some other important way?	NO	YES	NO	YES

ARE **C3 SUMMARY** AND **C5** AND **C6** CODED **YES** AND EITHER **C4a** or **b** or **c** CODED **YES**?

OR

ARE **C3 SUMMARY** AND **C4c** AND **C6** CODED **YES** AND IS **C5** CODED **NO**?

SPECIFY IF THE EPISODE IS CURRENT AND / OR PAST.

NO	YES
MANIC EPISODE	
CURRENT	<input type="checkbox"/>
PAST	<input type="checkbox"/>

ARE **C3 SUMMARY** AND **C5** AND **C6** CODED **NO** AND EITHER **C4b** OR **C4c** CODED **YES**?

OR

ARE **C3 SUMMARY** AND **C4b** AND **C6** CODED **YES** AND IS **C5** CODED **NO**?

SPECIFY IF THE EPISODE IS CURRENT AND / OR PAST.

NO	YES
HYPOMANIC EPISODE	
CURRENT	<input type="checkbox"/>
PAST	<input type="checkbox"/>

ARE **C3** SUMMARY AND **C4a** CODED **YES** AND IS **C5** CODED **NO**?

NO

YES

HYPOMANIC SYMPTOMS

SPECIFY IF THE EPISODE IS CURRENT AND / OR PAST.

CURRENT

☐

PAST

☐

C7

a) IF MANIC EPISODE IS POSITIVE FOR EITHER CURRENT OR PAST ASK:

Did you have 2 or more manic episodes (**C4c**) in your lifetime (including the current episode if present)? NO YES

b) IF HYPOMANIC EPISODE IS POSITIVE FOR EITHER CURRENT OR PAST ASK:

Did you have 2 or more hypomanic EPISODES (**C4b**) in your lifetime (including the current episode)? NO YES

c) IF PAST "HYPOMANIC SYMPTOMS" IS CODED POSITIVE ASK:

Did you have 2 or more episodes of hypomanic SYMPTOMS (**C4a**) in your lifetime (including the current episode if present)? NO YES

D. PANIC DISORDER

(➡ MEANS : CIRCLE NO IN D5, D6 AND D7 AND SKIP TO E1)

D1	<p>a Have you, on more than one occasion, had spells or attacks when you suddenly felt anxious, frightened, uncomfortable or uneasy, even in situations where most people would not feel that way?</p> <p>b Did the spells surge to a peak within 10 minutes of starting?</p>	➡ NO	YES YES
D2	At any time in the past, did any of those spells or attacks come on unexpectedly or occur in an unpredictable or unprovoked manner?	➡ NO	YES
D3	Have you ever had one such attack followed by a month or more of persistent concern about having another attack, or worries about the consequences of the attack - or did you make a significant change in your behavior because of the attacks (e.g., shopping only with a companion, not wanting to leave your house, visiting the emergency room repeatedly, or seeing your doctor more frequently because of the symptoms)?	NO	YES
D4	During the worst attack that you can remember:		
a	Did you have skipping, racing or pounding of your heart?	NO	YES
b	Did you have sweating or clammy hands?	NO	YES
c	Were you trembling or shaking?	NO	YES
d	Did you have shortness of breath or difficulty breathing?	NO	YES
e	Did you have a choking sensation or a lump in your throat?	NO	YES
f	Did you have chest pain, pressure or discomfort?	NO	YES
g	Did you have nausea, stomach problems or sudden diarrhea?	NO	YES
h	Did you feel dizzy, unsteady, lightheaded or faint?	NO	YES
i	Did things around you feel strange, unreal, detached or unfamiliar, or did you feel outside of or detached from part or all of your body?	NO	YES
j	Did you fear that you were losing control or going crazy?	NO	YES
k	Did you fear that you were dying?	NO	YES
l	Did you have tingling or numbness in parts of your body?	NO	YES
m	Did you have hot flushes or chills?	NO	YES
D5	ARE BOTH D3 , AND 4 OR MORE D4 ANSWERS, CODED YES ? IF YES TO D5, SKIP TO D7.	NO	YES
D6	IF D5 = NO , ARE ANY D4 ANSWERS CODED YES ? THEN SKIP TO E1 .	NO	YES

*PANIC DISORDER
LIFETIME*

*LIMITED SYMPTOM
ATTACKS LIFETIME*

D7	In the past month, did you have such attacks repeatedly (2 or more), and did you have persistent concern about having another attack, or worry about the consequences of the attacks, or did you change your behavior in any way because of the attacks?	NO	YES <i>PANIC DISORDER CURRENT</i>
----	--	----	--

E. AGORAPHOBIA

E1	Do you feel anxious or uneasy in places or situations where help might not be available or escape might be difficult, like being in a crowd, standing in a line (queue), when you are alone away from home or alone at home, or when crossing a bridge, or traveling in a bus, train or car or where you might have a panic attack or the panic-like symptoms we just spoke about?	NO	YES
----	--	----	-----

IF **E1** = **NO**, CIRCLE **NO** IN **E2**.

E2	Do you fear these situations so much that you avoid them, or suffer through them, or need a companion to face them?	NO	YES <i>AGORAPHOBIA CURRENT</i>
----	---	----	---------------------------------------

IS **E2** (CURRENT AGORAPHOBIA) CODED **YES**

and

IS **D7** (CURRENT PANIC DISORDER) CODED **YES**?

NO	YES
----	-----

***PANIC DISORDER
with Agoraphobia
CURRENT***

IS **E2** (CURRENT AGORAPHOBIA) CODED **NO**

and

IS **D7** (CURRENT PANIC DISORDER) CODED **YES**?

NO	YES
----	-----

***PANIC DISORDER
without Agoraphobia
CURRENT***

IS **E2** (CURRENT AGORAPHOBIA) CODED **YES**

and

IS **D5** (PANIC DISORDER LIFETIME) CODED **NO**?

NO	YES
----	-----

***AGORAPHOBIA, CURRENT
without history of
Panic Disorder***

F. SOCIAL PHOBIA (Social Anxiety Disorder)

(➡ MEANS : GO TO THE DIAGNOSTIC BOX, CIRCLE NO AND MOVE TO THE NEXT MODULE)

F1	In the past month, did you have persistent fear and significant anxiety at being watched, being the focus of attention, or of being humiliated or embarrassed? This includes things like speaking in public, eating in public or with others, writing while someone watches, or being in social situations.	➡ NO	YES
----	---	---------	-----

F2	Is this social fear excessive or unreasonable and does it almost always make you anxious?	➡ NO	YES
----	---	---------	-----

F3	Do you fear these social situations so much that you avoid them or suffer through them most of the time?	➡ NO	YES
----	--	---------	-----

F4	Do these social fears disrupt your normal work, school or social functioning or cause you significant distress?	NO	YES
----	---	----	-----

SOCIAL PHOBIA
(Social Anxiety Disorder)
CURRENT

GENERALIZED ☐

NON-GENERALIZED ☐

SUBTYPES

Do you fear and avoid 4 or more social situations?

If YES Generalized social phobia (social anxiety disorder)

If NO Non-generalized social phobia (social anxiety disorder)

EXAMPLES OF SUCH SOCIAL SITUATIONS TYPICALLY INCLUDE

- INITIATING OR MAINTAINING A CONVERSATION,
- PARTICIPATING IN SMALL GROUPS,
- DATING,
- SPEAKING TO AUTHORITY FIGURES,
- ATTENDING PARTIES,
- PUBLIC SPEAKING,
- EATING IN FRONT OF OTHERS,
- URINATING IN A PUBLIC WASHROOM, ETC.

NOTE TO INTERVIEWER: PLEASE ASSESS WHETHER THE SUBJECT'S FEARS ARE RESTRICTED TO NON-GENERALIZED ("ONLY 1 OR SEVERAL") SOCIAL SITUATIONS OR EXTEND TO GENERALIZED ("MOST") SOCIAL SITUATIONS. "MOST" SOCIAL SITUATIONS IS USUALLY OPERATIONALIZED TO MEAN 4 OR MORE SOCIAL SITUATIONS, ALTHOUGH THE DSM-IV DOES NOT EXPLICITLY STATE THIS.

G. OBSESSIVE-COMPULSIVE DISORDER

(➡ MEANS: GO TO THE DIAGNOSTIC BOX, CIRCLE NO AND MOVE TO THE NEXT MODULE)

G1	In the past month, have you been bothered by recurrent thoughts, impulses, or images that were unwanted, distasteful, inappropriate, intrusive, or distressing? - (For example, the idea that you were dirty, contaminated or had germs, or fear of contaminating others, or fear of harming someone even though it disturbs or distresses you, or fear you would act on some impulse, or fear or superstitions that you would be responsible for things going wrong, or obsessions with sexual thoughts, images or impulses, or hoarding, collecting, or religious obsessions.)	NO	YES
		↓	
		SKIP TO G4	

(DO NOT INCLUDE SIMPLY EXCESSIVE WORRIES ABOUT REAL LIFE PROBLEMS. DO NOT INCLUDE OBSESSIONS DIRECTLY RELATED TO EATING DISORDERS, SEXUAL DEVIATIONS, PATHOLOGICAL GAMBLING, OR ALCOHOL OR DRUG ABUSE BECAUSE THE PATIENT MAY DERIVE PLEASURE FROM THE ACTIVITY AND MAY WANT TO RESIST IT ONLY BECAUSE OF ITS NEGATIVE CONSEQUENCES.)

G2	Did they keep coming back into your mind even when you tried to ignore or get rid of them?	NO	YES
		↓	
		SKIP TO G4	

G3	Do you think that these obsessions are the product of your own mind and that they are not imposed from the outside?	NO	YES
			obsessions

G4	In the past month, did you do something repeatedly without being able to resist doing it, like washing or cleaning excessively, counting or checking things over and over, or repeating, collecting, arranging things, or other superstitious rituals?	NO	YES
			compulsions

IS G3 OR G4 CODED YES?

➡	NO	YES
---	----	-----

G5	At any point, did you recognize that either these obsessive thoughts or these compulsive behaviors were excessive or unreasonable?	NO	YES
		➡	

G6 In the past month, did these obsessive thoughts and/or compulsive behaviors significantly interfere with your normal routine, your work or school, your usual social activities, or relationships, or did they take more than one hour a day?

NO	YES
----	-----

***O.C.D.
CURRENT***

H. POSTTRAUMATIC STRESS DISORDER

(➔ MEANS : GO TO THE DIAGNOSTIC BOX, CIRCLE NO, AND MOVE TO THE NEXT MODULE)

H1	Have you ever experienced or witnessed or had to deal with an extremely traumatic event that included actual or threatened death or serious injury to you or someone else?	➔ NO	YES
----	--	---------	-----

EXAMPLES OF TRAUMATIC EVENTS INCLUDE: SERIOUS ACCIDENTS, SEXUAL OR PHYSICAL ASSAULT, A TERRORIST ATTACK, BEING HELD HOSTAGE, KIDNAPPING, FIRE, DISCOVERING A BODY, WAR, OR NATURAL DISASTER, WITNESSING THE VIOLENT OR SUDDEN DEATH OF SOMEONE CLOSE TO YOU, OR A LIFE THREATENING ILLNESS.

H2	Did you respond with intense fear, helplessness or horror?	➔ NO	YES
----	--	---------	-----

H3	During the past month, have you re-experienced the event in a distressing way (such as in dreams, intense recollections, flashbacks or physical reactions) or did you have intense distress when you were reminded about the event or exposed to a similar event?	➔ NO	YES
----	---	---------	-----

H4 In the past month:

a	Have you avoided thinking about or talking about the event ?	NO	YES
b	Have you avoided activities, places or people that remind you of the event?	NO	YES
c	Have you had trouble recalling some important part of what happened?	NO	YES
d	Have you become much less interested in hobbies or social activities?	NO	YES
e	Have you felt detached or estranged from others?	NO	YES
f	Have you noticed that your feelings are numbed?	NO	YES
g	Have you felt that your life will be shortened or that you will die sooner than other people?	NO	YES
	ARE 3 OR MORE H4 ANSWERS CODED YES ?	➔ NO	YES

H5 In the past month:

a	Have you had difficulty sleeping?	NO	YES
b	Were you especially irritable or did you have outbursts of anger?	NO	YES
c	Have you had difficulty concentrating?	NO	YES
d	Were you nervous or constantly on your guard?	NO	YES
e	Were you easily startled?	NO	YES
	ARE 2 OR MORE H5 ANSWERS CODED YES ?	➔ NO	YES

H6	During the past month, have these problems significantly interfered with your work, school or social activities, or caused significant distress?
----	--

NO	YES
----	-----

POSTTRAUMATIC STRESS DISORDER CURRENT
--

I. ALCOHOL DEPENDENCE / ABUSE

(➡ MEANS: GO TO DIAGNOSTIC BOXES, CIRCLE NO IN BOTH AND MOVE TO THE NEXT MODULE)

I1	In the past 12 months, have you had 3 or more alcoholic drinks, - within a 3 hour period, - on 3 or more occasions?	➡ NO	YES
----	---	---------	-----

I2	In the past 12 months:		
a	Did you need to drink a lot more in order to get the same effect that you got when you first started drinking or did you get much less effect with continued use of the same amount?	NO	YES
b	When you cut down on drinking did your hands shake, did you sweat or feel agitated? Did you drink to avoid these symptoms (for example, "the shakes", sweating or agitation) or to avoid being hungover? <small>IF YES TO ANY, CODE YES.</small>	NO	YES
c	During the times when you drank alcohol, did you end up drinking more than you planned when you started?	NO	YES
d	Have you tried to reduce or stop drinking alcohol but failed?	NO	YES
e	On the days that you drank, did you spend substantial time in obtaining alcohol, drinking, or in recovering from the effects of alcohol?	NO	YES
f	Did you spend less time working, enjoying hobbies, or being with others because of your drinking?	NO	YES
g	If your drinking caused you health or mental problems, did you still keep on drinking?	NO	YES

ARE 3 OR MORE I2 ANSWERS CODED YES?

* IF YES, SKIP I3 QUESTIONS AND GO TO NEXT MODULE. "DEPENDENCE PREEMPTS ABUSE" IN DSM IV TR.

NO **YES***

**ALCOHOL DEPENDENCE
CURRENT**

I3	In the past 12 months:		
a	Have you been intoxicated, high, or hungover more than once when you had other responsibilities at school, at work, or at home? Did this cause any problems? <small>(CODE YES ONLY IF THIS CAUSED PROBLEMS.)</small>	NO	YES
b	Were you intoxicated more than once in any situation where you were physically at risk, for example, driving a car, riding a motorbike, using machinery, boating, etc.?	NO	YES
c	Did you have legal problems more than once because of your drinking, for example, an arrest or disorderly conduct?	NO	YES
d	If your drinking caused problems with your family or other people, did you still keep on drinking?	NO	YES

ARE **1** OR MORE **I3** ANSWERS CODED **YES**?

NO

YES

***ALCOHOL ABUSE
CURRENT***

J. SUBSTANCE DEPENDENCE / ABUSE (NON-ALCOHOL)

(➡ MEANS : GO TO THE DIAGNOSTIC BOXES, CIRCLE NO IN ALL DIAGNOSTIC BOXES, AND MOVE TO THE NEXT MODULE)

Now I am going to show you / read to you a list of street drugs or medicines.

- | | | | | |
|----|---|---|---------|-----|
| J1 | a | In the past 12 months, did you take any of these drugs more than once, to get high, to feel elated, to get "a buzz" or to change your mood? | ➡
NO | YES |
|----|---|---|---------|-----|

CIRCLE EACH DRUG TAKEN:

Stimulants: amphetamines, "speed", crystal meth, "crank", "rush", Dexedrine, Ritalin, diet pills.

Cocaine: snorting, IV, freebase, crack, "speedball".

Narcotics: heroin, morphine, Dilaudid, opium, Demerol, methadone, Darvon, codeine, Percodan, Vicoden, OxyContin.

Hallucinogens: LSD ("acid"), mescaline, peyote, psilocybin, STP, "mushrooms", "ecstasy", MDA, MDMA.

Phencyclidine: PCP ("Angel Dust", "PeaCe Pill", "Tranq", "Hog"), or ketamine ("special K").

Inhalants: "glue", ethyl chloride, "rush", nitrous oxide ("laughing gas"), amyl or butyl nitrate ("poppers").

Cannabis: marijuana, hashish ("hash"), THC, "pot", "grass", "weed", "reefer".

Tranquilizers: Quaalude, Seconal ("reds"), Valium, Xanax, Librium, Ativan, Dalmane, Halcion, barbiturates, Miltown, GHB, Roofinol, "Roofies".

Miscellaneous: steroids, nonprescription sleep or diet pills. Cough Medicine? Any others?

SPECIFY THE MOST USED DRUG(S): _____

WHICH DRUG(S) CAUSE THE BIGGEST PROBLEMS?: _____

FIRST EXPLORE THE DRUG CAUSING THE BIGGEST PROBLEMS AND MOST LIKELY TO MEET DEPENDENCE / ABUSE CRITERIA.

IF MEETS CRITERIA FOR ABUSE OR DEPENDENCE, SKIP TO THE NEXT MODULE. OTHERWISE, EXPLORE THE NEXT MOST PROBLEMATIC DRUG.

- J2 **Considering your use of (NAME THE DRUG / DRUG CLASS SELECTED), in the past 12 months:**

- | | | | |
|-----------------------------|--|----|-----|
| a | Have you found that you needed to use much more (NAME OF DRUG / DRUG CLASS SELECTED) to get the same effect that you did when you first started taking it? | NO | YES |
| b | When you reduced or stopped using (NAME OF DRUG / DRUG CLASS SELECTED), did you have withdrawal symptoms (aches, shaking, fever, weakness, diarrhea, nausea, sweating, heart pounding, difficulty sleeping, or feeling agitated, anxious, irritable, or depressed)? Did you use any drug(s) to keep yourself from getting sick (withdrawal symptoms) or so that you would feel better? | NO | YES |
| IF YES TO EITHER, CODE YES. | | | |
| c | Have you often found that when you used (NAME OF DRUG / DRUG CLASS SELECTED), you ended up taking more than you thought you would? | NO | YES |
| d | Have you tried to reduce or stop taking (NAME OF DRUG / DRUG CLASS SELECTED) but failed? | NO | YES |
| e | On the days that you used (NAME OF DRUG / DRUG CLASS SELECTED), did you spend substantial time (>2 HOURS), obtaining, using or in recovering from the drug, or thinking about the drug? | NO | YES |
| f | Did you spend less time working, enjoying hobbies, or being with family or friends because of your drug use? | NO | YES |
| g | If (NAME OF DRUG / DRUG CLASS SELECTED) caused you health or mental problems, did you still keep on using it? | NO | YES |

ARE **3** OR MORE **J2** ANSWERS CODED **YES**?

SPECIFY DRUG(S): _____

***** IF YES, SKIP J3 QUESTIONS, MOVE TO NEXT DISORDER.
“DEPENDENCE PREEMPTS ABUSE” IN DSM IV TR.

NO

YES *

***SUBSTANCE DEPENDENCE
CURRENT***

Considering your use of (NAME THE DRUG CLASS SELECTED), in the past 12 months:

- J3 a Have you been intoxicated, high, or hungover from (NAME OF DRUG / DRUG CLASS SELECTED) more than once, when you had other responsibilities at school, at work, or at home? Did this cause any problem?

NO

YES

(CODE **YES** ONLY IF THIS CAUSED PROBLEMS.)

- b Have you been high or intoxicated from (NAME OF DRUG / DRUG CLASS SELECTED) more than once in any situation where you were physically at risk (for example, driving a car, riding a motorbike, using machinery, boating, etc.)?

NO

YES

- c Did you have legal problems more than once because of your drug use, for example, an arrest or disorderly conduct?

NO

YES

- d If (NAME OF DRUG / DRUG CLASS SELECTED) caused problems with your family or other people, did you still keep on using it?

NO

YES

ARE **1** OR MORE **J3** ANSWERS CODED **YES**?

SPECIFY DRUG(S): _____

NO

YES

***SUBSTANCE ABUSE
CURRENT***

K. PSYCHOTIC DISORDERS AND MOOD DISORDER WITH PSYCHOTIC FEATURES

ASK FOR AN EXAMPLE OF EACH QUESTION ANSWERED POSITIVELY. CODE **YES** ONLY IF THE EXAMPLES CLEARLY SHOW A DISTORTION OF THOUGHT OR OF PERCEPTION OR IF THEY ARE NOT CULTURALLY APPROPRIATE. BEFORE CODING, INVESTIGATE WHETHER DELUSIONS QUALIFY AS "BIZARRE".

DELUSIONS ARE "BIZARRE" IF: CLEARLY IMPLAUSIBLE, ABSURD, NOT UNDERSTANDABLE, AND CANNOT DERIVE FROM ORDINARY LIFE EXPERIENCE.

HALLUCINATIONS ARE SCORED "BIZARRE" IF: A VOICE COMMENTS ON THE PERSON'S THOUGHTS OR BEHAVIOR, OR WHEN TWO OR MORE VOICES ARE CONVERSING WITH EACH OTHER.

THE PURPOSE OF THIS MODULE IS TO EXCLUDE PATIENTS WITH PSYCHOTIC DISORDERS. THIS MODULE NEEDS EXPERIENCE.

Now I am going to ask you about unusual experiences that some people have.				BIZARRE
K1	a	Have you ever believed that people were spying on you, or that someone was plotting against you, or trying to hurt you?	NO YES	YES
		NOTE: ASK FOR EXAMPLES TO RULE OUT ACTUAL STALKING.		
	b	IF YES OR YES BIZARRE: do you currently believe these things?	NO YES	YES ↳K6
K2	a	Have you ever believed that someone was reading your mind or could hear your thoughts, or that you could actually read someone's mind or hear what another person was thinking?	NO YES	YES
	b	IF YES OR YES BIZARRE: do you currently believe these things?	NO YES	YES ↳K6
K3	a	Have you ever believed that someone or some force outside of yourself put thoughts in your mind that were not your own, or made you act in a way that was not your usual self? Have you ever felt that you were possessed?	NO YES	YES
		CLINICIAN: ASK FOR EXAMPLES AND DISCOUNT ANY THAT ARE NOT PSYCHOTIC.		
	b	IF YES OR YES BIZARRE: do you currently believe these things?	NO YES	YES ↳K6
K4	a	Have you ever believed that you were being sent special messages through the TV, radio, newspapers, books or magazines or that a person you did not personally know was particularly interested in you?	NO YES	YES
	b	IF YES OR YES BIZARRE: do you currently believe these things?	NO YES	YES ↳K6
K5	a	Have your relatives or friends ever considered any of your beliefs odd or unusual?	NO YES	YES
		INTERVIEWER: ASK FOR EXAMPLES. ONLY CODE YES IF THE EXAMPLES ARE CLEARLY DELUSIONAL IDEAS NOT EXPLORED IN QUESTIONS K1 TO K4, FOR EXAMPLE, SOMATIC OR RELIGIOUS DELUSIONS OR DELUSIONS OF GRANDIOSITY, JEALOUSY, GUILT, RUIN OR DESTITUTION, ETC.		
	b	IF YES OR YES BIZARRE: do they currently consider your beliefs strange?	NO YES	YES
K6	a	Have you ever heard things other people couldn't hear, such as voices?	NO YES	
		IF YES TO VOICE HALLUCINATION: Was the voice commenting on your thoughts or behavior or did you hear two or more voices talking to each other?	NO	YES
	b	IF YES OR YES BIZARRE TO K6a: have you heard sounds / voices in the past month?	NO YES	
		IF YES TO VOICE HALLUCINATION: Was the voice commenting on your thoughts or behavior or did you hear two or more voices talking to each other?	NO	YES ↳K8b

K7 a Have you ever had visions when you were awake or have you ever seen things other people couldn't see? NO YES

CLINICIAN: CHECK TO SEE IF THESE ARE CULTURALLY INAPPROPRIATE.

b IF YES: have you seen these things in the past month? NO YES

CLINICIAN'S JUDGMENT

K8 b IS THE PATIENT CURRENTLY EXHIBITING INCOHERENCE, DISORGANIZED SPEECH, OR MARKED LOOSENING OF ASSOCIATIONS? NO YES

K9 b IS THE PATIENT CURRENTLY EXHIBITING DISORGANIZED OR CATATONIC BEHAVIOR? NO YES

K10 b ARE NEGATIVE SYMPTOMS OF SCHIZOPHRENIA, E.G. SIGNIFICANT AFFECTIVE FLATTENING, POVERTY OF SPEECH (ALOGIA) OR AN INABILITY TO INITIATE OR PERSIST IN GOAL-DIRECTED ACTIVITIES (AVOLITION), PROMINENT DURING THE INTERVIEW? NO YES

K11 a ARE 1 OR MORE « a » QUESTIONS FROM K1a TO K7a CODED YES OR YES BIZARRE AND IS EITHER:

MAJOR DEPRESSIVE EPISODE, (CURRENT, RECURRENT OR PAST)

OR

MANIC OR HYPOMANIC EPISODE, (CURRENT OR PAST) CODED YES?

NO YES
↳ K13

IF NO TO K11 a, CIRCLE NO IN BOTH 'MOOD DISORDER WITH PSYCHOTIC FEATURES' DIAGNOSTIC BOXES AND MOVE TO K13.

b You told me earlier that you had period(s) when you felt (depressed/high/persistently irritable).

Were the beliefs and experiences you just described (SYMPTOMS CODED YES FROM K1a TO K7a) restricted exclusively to times when you were feeling depressed/high/irritable?

IF THE PATIENT EVER HAD A PERIOD OF AT LEAST 2 WEEKS OF HAVING THESE BELIEFS OR EXPERIENCES (PSYCHOTIC SYMPTOMS) WHEN THEY WERE NOT DEPRESSED/HIGH/IRRITABLE, CODE NO TO THIS DISORDER.

IF THE ANSWER IS NO TO THIS DISORDER, ALSO CIRCLE NO TO K12 AND MOVE TO K13

NO YES

**MOOD DISORDER WITH
PSYCHOTIC FEATURES**

LIFETIME

K12 a ARE 1 OR MORE « b » QUESTIONS FROM K1b TO K7b CODED YES OR YES BIZARRE AND IS EITHER:

MAJOR DEPRESSIVE EPISODE, (CURRENT)

OR

MANIC OR HYPOMANIC EPISODE, (CURRENT) CODED YES?

NO YES

**MOOD DISORDER WITH
PSYCHOTIC FEATURES**

CURRENT

IF THE ANSWER IS YES TO THIS DISORDER (LIFETIME OR CURRENT), CIRCLE NO TO K13 AND K14 AND MOVE TO THE NEXT MODULE.

K13 ARE 1 OR MORE « b » QUESTIONS FROM K1b TO K6b, CODED **YES BIZARRE**?

OR

ARE 2 OR MORE « b » QUESTIONS FROM K1b TO K10b, CODED **YES** (RATHER THAN **YES BIZARRE**)?

AND DID AT LEAST TWO OF THE PSYCHOTIC SYMPTOMS OCCUR DURING THE SAME 1 MONTH PERIOD?

NO

YES

***PSYCHOTIC DISORDER
CURRENT***

K14 IS **K13** CODED **YES**

OR

ARE 1 OR MORE « a » QUESTIONS FROM K1a TO K6a, CODED **YES BIZARRE**?

OR

ARE 2 OR MORE « a » QUESTIONS FROM K1a TO K7a, CODED **YES** (RATHER THAN **YES BIZARRE**)

AND DID AT LEAST TWO OF THE PSYCHOTIC SYMPTOMS OCCUR DURING THE SAME 1 MONTH PERIOD?

NO

YES

***PSYCHOTIC DISORDER
LIFETIME***

L. ANOREXIA NERVOSA

(➔ MEANS : GO TO THE DIAGNOSTIC BOX, CIRCLE NO, AND MOVE TO THE NEXT MODULE)

L1	a	How tall are you?	<input type="text"/> ft <input type="text"/> in.
			<input type="text"/> cm.
	b.	What was your lowest weight in the past 3 months?	<input type="text"/> lbs.
			<input type="text"/> kgs.
c		IS PATIENT'S WEIGHT EQUAL TO OR BELOW THE THRESHOLD CORRESPONDING TO HIS / HER HEIGHT? (SEE TABLE BELOW)	➔ NO YES

In the past 3 months:

L2		In spite of this low weight, have you tried not to gain weight?	➔ NO YES
L3		Have you intensely feared gaining weight or becoming fat, even though you were underweight?	➔ NO YES
L4	a	Have you considered yourself too big / fat or that part of your body was too big / fat?	NO YES
	b	Has your body weight or shape greatly influenced how you felt about yourself?	NO YES
	c	Have you thought that your current low body weight was normal or excessive?	NO YES
L5		ARE 1 OR MORE ITEMS FROM L4 CODED YES?	➔ NO YES
L6		FOR WOMEN ONLY: During the last 3 months, did you miss all your menstrual periods when they were expected to occur (when you were not pregnant)?	➔ NO YES

FOR WOMEN: ARE L5 AND L6 CODED YES?

FOR MEN: IS L5 CODED YES?

NO YES

**ANOREXIA NERVOSA
CURRENT**

HEIGHT / WEIGHT TABLE CORRESPONDING TO A BMI THRESHOLD OF 17.5 kg/m²

Height/Weight														
ft/in	4'9	4'10	4'11	5'0	5'1	5'2	5'3	5'4	5'5	5'6	5'7	5'8	5'9	5'10
lbs.	81	84	87	89	92	96	99	102	105	108	112	115	118	122
cm	145	147	150	152	155	158	160	163	165	168	170	173	175	178
kgs	37	38	39	41	42	43	45	46	48	49	51	52	54	55

Height/Weight					
ft/in	5'11	6'0	6'1	6'2	6'3
lbs.	125	129	132	136	140
cm	180	183	185	188	191
kgs	57	59	60	62	64

The weight thresholds above are calculated using a body mass index (BMI) equal to or below 17.5 kg/m² for the patient's height. This is the threshold guideline below which a person is deemed underweight by the DSM-IV and the ICD-10 Diagnostic Criteria for Research for Anorexia Nervosa.

M. BULIMIA NERVOSA

(➔ MEANS : GO TO THE DIAGNOSTIC BOXES, CIRCLE NO IN ALL DIAGNOSTIC BOXES, AND MOVE TO THE NEXT MODULE)

M1	In the past three months, did you have eating binges or times when you ate a very large amount of food within a 2-hour period?	➔ NO	YES
M2	In the last 3 months, did you have eating binges as often as twice a week?	➔ NO	YES
M3	During these binges, did you feel that your eating was out of control?	➔ NO	YES
M4	Did you do anything to compensate for, or to prevent a weight gain from these binges, like vomiting, fasting, exercising or taking laxatives, enemas, diuretics (fluid pills), or other medications?	➔ NO	YES
M5	Does your body weight or shape greatly influence how you feel about yourself?	➔ NO	YES
M6	DO THE PATIENT'S SYMPTOMS MEET CRITERIA FOR ANOREXIA NERVOSA?	NO ↓ Skip to M8	YES
M7	Do these binges occur only when you are under (____lbs./kgs.)? <small>INTERVIEWER: WRITE IN THE ABOVE PARENTHESIS THE THRESHOLD WEIGHT FOR THIS PATIENT'S HEIGHT FROM THE HEIGHT / WEIGHT TABLE IN THE ANOREXIA NERVOSA MODULE.</small>	NO	YES

M8 IS **M5** CODED **YES** AND IS EITHER **M6** OR **M7** CODED **NO**?

NO YES

**BULIMIA NERVOSA
CURRENT**

IS **M7** CODED **YES**?

NO YES

**ANOREXIA NERVOSA
Binge Eating/Purging Type
CURRENT**

N. GENERALIZED ANXIETY DISORDER

(➔ MEANS : GO TO THE DIAGNOSTIC BOX, CIRCLE NO, AND MOVE TO THE NEXT MODULE)

N1	a	Were you excessively anxious or worried about several routine things, over the past 6 months? IN ENGLISH, IF THE PATIENT IS UNCLEAR ABOUT WHAT YOU MEAN, PROBE BY ASKING (Do others think that you are a “worry wart”) AND GET EXAMPLES.	➔ NO	YES
	b	Are these anxieties and worries present most days?	➔ NO	YES
		ARE THE PATIENT’S ANXIETY AND WORRIES RESTRICTED EXCLUSIVELY TO, OR BETTER EXPLAINED BY, ANY DISORDER PRIOR TO THIS POINT?	NO	➔ YES
N2		Do you find it difficult to control the worries?	➔ NO	YES
N3		FOR THE FOLLOWING, CODE NO IF THE SYMPTOMS ARE CONFINED TO FEATURES OF ANY DISORDER EXPLORED PRIOR TO THIS POINT. When you were anxious over the past 6 months, did you, most of the time:		
	a	Feel restless, keyed up or on edge?	NO	YES
	b	Have muscle tension?	NO	YES
	c	Feel tired, weak or exhausted easily?	NO	YES
	d	Have difficulty concentrating or find your mind going blank?	NO	YES
	e	Feel irritable?	NO	YES
	f	Have difficulty sleeping (difficulty falling asleep, waking up in the middle of the night, early morning waking or sleeping excessively)?	NO	YES
		ARE 3 OR MORE N3 ANSWERS CODED YES ?	➔ NO	YES
N4		Do these anxieties and worries disrupt your normal work, school or social functioning or cause you significant distress?	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>NO YES</p> <p>GENERALIZED ANXIETY DISORDER CURRENT</p> </div>	

O. RULE OUT MEDICAL, ORGANIC OR DRUG CAUSES FOR ALL DISORDERS

IF THE PATIENT CODES POSITIVE FOR ANY CURRENT DISORDER ASK:

Just before these symptoms began:

- O1a Were you taking any drugs or medicines? ☐ No ☐ Yes ☐ Uncertain
- O1b Did you have any medical illness? ☐ No ☐ Yes ☐ Uncertain

IN THE CLINICIAN’S JUDGMENT: ARE EITHER OF THESE LIKELY TO BE DIRECT CAUSES OF THE PATIENT’S DISORDER?
IF NECESSARY ASK ADDITIONAL OPEN-ENDED QUESTIONS.

- O2 SUMMARY:** HAS AN ORGANIC CAUSE BEEN RULED OUT? ☐ No ☐ Yes ☐ Uncertain

P. ANTISOCIAL PERSONALITY DISORDER

(➡ MEANS : GO TO THE DIAGNOSTIC BOX AND CIRCLE NO)

P1 Before you were 15 years old, did you:

- | | | | |
|-------------------------------------|---|----|-----|
| a | repeatedly skip school or run away from home overnight? | NO | YES |
| b | repeatedly lie, cheat, "con" others, or steal? | NO | YES |
| c | start fights or bully, threaten, or intimidate others? | NO | YES |
| d | deliberately destroy things or start fires? | NO | YES |
| e | deliberately hurt animals or people? | NO | YES |
| f | force someone to have sex with you? | NO | YES |
| | | ➡ | |
| ARE 2 OR MORE P1 ANSWERS CODED YES? | | NO | YES |

DO NOT CODE YES TO THE BEHAVIORS BELOW IF THEY ARE EXCLUSIVELY POLITICALLY OR RELIGIOUSLY MOTIVATED.

P2 Since you were 15 years old, have you:

- | | | | |
|---|--|----|-----|
| a | repeatedly behaved in a way that others would consider irresponsible, like failing to pay for things you owed, deliberately being impulsive or deliberately not working to support yourself? | NO | YES |
| b | done things that are illegal even if you didn't get caught (for example, destroying property, shoplifting, stealing, selling drugs, or committing a felony)? | NO | YES |
| c | been in physical fights repeatedly (including physical fights with your spouse or children)? | NO | YES |
| d | often lied or "conned" other people to get money or pleasure, or lied just for fun? | NO | YES |
| e | exposed others to danger without caring? | NO | YES |
| f | felt no guilt after hurting, mistreating, lying to, or stealing from others, or after damaging property? | NO | YES |

ARE 3 OR MORE P2 QUESTIONS CODED YES?

NO

YES

**ANTISOCIAL PERSONALITY
DISORDER
LIFETIME**

THIS CONCLUDES THE INTERVIEW

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MOOD DISORDERS: DIAGNOSTIC ALGORITHM

Consult Modules:

A	Major Depressive Episode
C	(Hypo) manic Episode
K	Psychotic Disorders

MODULE K:

1a	IS K11b CODED YES?	NO	YES
1b	IS K12a CODED YES?	NO	YES

MODULES A and C:

		Current	Past
2	a	CIRCLE YES IF A DELUSIONAL IDEA IS IDENTIFIED IN A3e ?	YES YES
	b	CIRCLE YES IF A DELUSIONAL IDEA IS IDENTIFIED IN C3a ?	YES YES

- c Is a Major Depressive Episode coded YES (current or past)?
and
 is Manic Episode coded NO (current and past)?
and
 is Hypomanic Episode coded NO (current and past)?
and
 is "Hypomanic Symptoms" coded NO (current and past)?

Specify:

- If the depressive episode is **current** or **past** or both
- With Psychotic Features** Current: If 1b or 2a (current) = YES
 With Psychotic Features Past: If 1a or 2a (past) = YES

MAJOR DEPRESSIVE DISORDER		
	current	past
MDD	<input type="checkbox"/>	<input type="checkbox"/>
With Psychotic Features		
Current	<input type="checkbox"/>	
Past	<input type="checkbox"/>	

- d Is a Manic Episode coded YES (current or past)?

Specify:

- If the Bipolar I Disorder is **current** or **past** or both
- With **Single Manic Episode**: If Manic episode (current or past) = YES
 and MDE (current and past) = NO
- With Psychotic Features** Current: If 1b or 2a (current) or 2b (current) = YES
 With Psychotic Features Past: If 1a or 2a (past) or 2b (past) = YES
- If the **most recent episode** is manic, depressed, mixed or hypomanic or unspecified (all mutually exclusive)
- Unspecified** if the Past Manic Episode is coded YES AND
 Current (C3 Summary AND C4a AND C6 AND O2) are coded YES

BIPOLAR I DISORDER		
	current	past
Bipolar I Disorder	<input type="checkbox"/>	<input type="checkbox"/>
Single Manic Episode	<input type="checkbox"/>	<input type="checkbox"/>
With Psychotic Features		
Current	<input type="checkbox"/>	
Past	<input type="checkbox"/>	
Most Recent Episode		
Manic	<input type="checkbox"/>	
Depressed	<input type="checkbox"/>	
Mixed	<input type="checkbox"/>	
Hypomanic	<input type="checkbox"/>	
Unspecified	<input type="checkbox"/>	

- e Is Major Depressive Episode coded YES (current or past)?
and
 Is Hypomanic Episode coded YES (current or past)?
and
 Is Manic Episode coded NO (current and past)?

Specify:

- If the Bipolar Disorder is **current** or **past** or both
- If the most recent mood episode is **hypomanic** or **depressed** (mutually exclusive)

<i>BIPOLAR II DISORDER</i>		
	current	past
Bipolar II Disorder	<input type="checkbox"/>	<input type="checkbox"/>
<i>Most Recent Episode</i>		
Hypomanic	<input type="checkbox"/>	
Depressed	<input type="checkbox"/>	

- f Is MDE coded NO (current and past)
and
 Is Manic Episode coded NO (current and past)?
and is either:

1) C7b coded YES for the appropriate time frame?

or

2) C3 Summary coded YES for the appropriate time frame?

and

C4a coded YES for the appropriate time frame?

and

C7c coded YES for the appropriate time frame?

Specify if the Bipolar Disorder NOS is **current** or **past** or both

<i>BIPOLAR DISORDER NOS</i>		
	current	past
Bipolar Disorder NOS	<input type="checkbox"/>	<input type="checkbox"/>

M.I.N.I. PLUS

The shaded modules below are additional modules available in the MINI PLUS beyond what is available in the standard MINI. The un-shaded modules below are in the standard MINI.

These MINI PLUS modules can be inserted into or used in place of the standard MINI modules, as dictated by the specific needs of any study.

MODULES		TIME FRAME
A	MAJOR DEPRESSIVE EPISODE	Current (2 weeks) Past Recurrent
	MOOD DISORDER DUE TO A GENERAL MEDICAL CONDITION	Current Past
	SUBSTANCE INDUCED MOOD DISORDER	Current Past
	MDE WITH MELANCHOLIC FEATURES	Current (2 weeks)
	MDE WITH ATYPICAL FEATURES	Current (2 weeks)
	MDE WITH CATATONIC FEATURES	Current (2 weeks)
B	DYSTHYMIA	Current (Past 2 years) Past
C	SUICIDALITY	Current (Past Month) Risk: <input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
D	MANIC EPISODE	Current Past
	HYPOMANIC EPISODE	Current Past
	BIPOLAR I DISORDER	Current Past
	BIPOLAR II DISORDER	Current Past
	BIPOLAR DISORDER NOS	Current Past
	MANIC EPISODE DUE TO A GENERAL MEDICAL CONDITION	Current Past
	HYPOMANIC EPISODE DUE TO A GENERAL MEDICAL CONDITION	Current Past
	SUBSTANCE INDUCED MANIC EPISODE	Current Past
	SUBSTANCE INDUCED HYPOMANIC EPISODE	Current Past
E	PANIC DISORDER	Current (Past Month) Lifetime
	ANXIETY DISORDER WITH PANIC ATTACKS DUE TO A GENERAL MEDICAL CONDITION	Current
	SUBSTANCE INDUCED ANXIETY DISORDER WITH PANIC ATTACKS	Current
F	AGORAPHOBIA	Current
G	SOCIAL PHOBIA (Social Anxiety Disorder)	Current (Past Month)
H	SPECIFIC PHOBIA	Current
I	OBSESSIVE-COMPULSIVE DISORDER	Current (Past Month)
	OCD DUE TO A GENERAL MEDICAL CONDITION	Current
	SUBSTANCE INDUCED OCD	Current
J	POSTTRAUMATIC STRESS DISORDER	Current (Past Month)
K	ALCOHOL DEPENDENCE	Past 12 Months
	ALCOHOL DEPENDENCE	Lifetime
	ALCOHOL ABUSE	Past 12 Months
	ALCOHOL ABUSE	Lifetime
L	SUBSTANCE DEPENDENCE (Non-alcohol)	Past 12 Months
	SUBSTANCE DEPENDENCE (Non-alcohol)	Lifetime
	SUBSTANCE ABUSE (Non-alcohol)	Past 12 Months

M	PSYCHOTIC DISORDERS	Lifetime
		Current
	MOOD DISORDER WITH PSYCHOTIC FEATURES	Current
	SCHIZOPHRENIA	Current
		Lifetime
	SCHIZOAFFECTIVE DISORDER	Current
		Lifetime
	SCHIZOPHRENIFORM DISORDER	Current
		Lifetime
	BRIEF PSYCHOTIC DISORDER	Current
		Lifetime
	DELUSIONAL DISORDER	Current
		Lifetime
	PSYCHOTIC DISORDER DUE TO A GENERAL MEDICAL CONDITION	Current
		Lifetime
	SUBSTANCE INDUCED PSYCHOTIC DISORDER	Current
		Lifetime
	PSYCHOTIC DISORDER NOS	Current
		Lifetime
	MOOD DISORDER WITH PSYCHOTIC FEATURES	Lifetime
	MOOD DISORDER NOS	Lifetime
	MAJOR DEPRESSIVE DISORDER WITH PSYCHOTIC FEATURES	Current
		Past
	BIPOLAR I DISORDER WITH PSYCHOTIC FEATURES	Current
		Past
N	ANOREXIA NERVOSA	Current (Past 3 Months)
O	BULIMIA NERVOSA	Current (Past 3 Months)
	BULIMIA NERVOSA PURGING TYPE	Current
	BULIMIA NERVOSA NONPURGING TYPE	Current
	ANOREXIA NERVOSA, BINGE EATING/PURGING TYPE	Current
	ANOREXIA NERVOSA, RESTRICTING TYPE	Current
P	GENERALIZED ANXIETY DISORDER	Current (Past 6 Months)
	GENERALIZED ANXIETY DISORDER DUE TO A GENERAL MEDICAL CONDITION	Current
	SUBSTANCE INDUCED GAD	Current
Q	ANTISOCIAL PERSONALITY DISORDER	Lifetime
R	SOMATIZATION DISORDER	Lifetime
		Current
S	HYPOCHONDRIASIS	Current
T	BODY DYSMORPHIC DISORDER	Current
U	PAIN DISORDER	Current
V	CONDUCT DISORDER	Past 12 Months
W	ATTENTION DEFICIT/HYPERACTIVITY DISORDER (Children/Adolescents)	Past 6 Months
	ATTENTION DEFICIT/HYPERACTIVITY DISORDER (Adults)	Lifetime
		Current
X	ADJUSTMENT DISORDERS	Current
Y	PREMENSTRUAL DYSPHORIC DISORDER	Current
Z	MIXED ANXIETY-DEPRESSIVE DISORDER	Current

ID#: _____ Examiner: _____

Sex: ☐ F ☐ M

Race/Ethnicity: _____ Education (years): _____

Handedness: ☐ R ☐ L ☐ Ambidextrous

Hearing adequate? ☐ Y ☐ N

Hearing aid? ☐ Y ☐ N

First language: _____ Preferred language: _____ Effort appear adequate? ☐ Y ☐ ? ☐ N

Affect and mood: _____ Physical appearance: _____

Other behaviors: _____

Major complaints: _____

Diagnostic history: _____

Current medications: _____

	Year	Month	Day
Date Tested			

Age at Testing			
----------------	--	--	--

	Raw Score	Standard Score		Raw Score	Standard Score
Trial 1 Free Recall Correct			Long-Delay Free Recall Correct		
Trial 2 Free Recall Correct			Long-Delay Cued Recall Correct		
Trial 3 Free Recall Correct			Free-Recall Intrusions (Immediate & Delayed, All Types)		
Trial 4 Free Recall Correct			Cued-Recall Intrusions (All Types)		
Trial 5 Free Recall Correct			Total Intrusions (All Recall Trials, All Types)		
Trials 1–5 Free Recall Total Correct		(T score)	Total Repetitions (All Recall Trials)		
List B Free Recall Correct			Long-Delay Yes/No Recognition Hits		
Short-Delay Free Recall Correct			Long-Delay Yes/No Recognition False-Positives		
Short-Delay Cued Recall Correct			Long-Delay Forced-Choice Recognition Accuracy (# hits ____/16) × 100	%	

List A Immediate Free Recall Trial 1

I'm going to read a list of words to you. Listen carefully, because when I'm through, I want you to tell me as many of the words as you can. You can say them in any order, just say as many of them as you can. Are you ready?

Read List A at an even pace, taking slightly longer than one second per word, so the entire list takes 18 to 20 seconds. Then say: **Go ahead.**

List A
truck
spinach
giraffe
bookcase
onion
motorcycle
cabinet
zebra
subway
lamp
celery
cow
desk
boat
squirrel
cabbage

Trial 2

I'm going to read the same list again. Like before, tell me as many of the words as you can, in any order. Be sure to also say words from the list that you told me the first time.

Trials 3 and 4

I'm going to read the same list again. Like before, tell me as many of the words as you can, in any order, including words from the list you've said before.

Trial 5

I'm going to read the same list one more time. Like before, tell me as many of the words as you can, in any order, including words from the list you've said before.

Record all responses verbatim, in the order recalled. Prompt only once (e.g., Anything else?) at the end of each free and cued recall trial (i.e., after 15 seconds with no response or when the examinee says he/she cannot remember more words).

Trial 1			Trial 2			Trial 3			Trial 4			Trial 5		
		Resp Type			Resp Type			Resp Type			Resp Type			Resp Type
1			1			1			1			1		
2			2			2			2			2		
3			3			3			3			3		
4			4			4			4			4		
5			5			5			5			5		
6			6			6			6			6		
7			7			7			7			7		
8			8			8			8			8		
9			9			9			9			9		
10			10			10			10			10		
11			11			11			11			11		
12			12			12			12			12		
13			13			13			13			13		
14			14			14			14			14		
15			15			15			15			15		
16			16			16			16			16		
17			17			17			17			17		
18			18			18			18			18		
19			19			19			19			19		
20			20			20			20			20		
Total Correct C <input type="text"/>			Total Correct C <input type="text"/>			Total Correct C <input type="text"/>			Total Correct C <input type="text"/>			Total Correct C <input type="text"/>		
Total Repetitions R <input type="text"/>			Total Repetitions R <input type="text"/>			Total Repetitions R <input type="text"/>			Total Repetitions R <input type="text"/>			Total Repetitions R <input type="text"/>		
Total Intrusions I <input type="text"/>			Total Intrusions I <input type="text"/>			Total Intrusions I <input type="text"/>			Total Intrusions I <input type="text"/>			Total Intrusions I <input type="text"/>		

List B Immediate Free Recall

Now I'm going to read a second list of words to you. When I'm through, I want you to tell me as many words from this second list as you can, in any order. Don't tell me words from the first list, just this second list.

Read List B at an even pace, taking slightly longer than one second per word, so the entire list takes 18 to 20 seconds. Then say: **Go ahead.**

List B

violin
cucumber
elephant
closet
turnip
guitar
basement
sheep
clarinet
garage
corn
rabbit
patio
saxophone
tiger
radishes

Trial B	Resp Type
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
Total Correct C	
Total Repetitions R	
Total Intrusions I	

List A Short-Delay Free Recall

Now I want you to tell me all the words you can from the *first* list, the one I read to you several times. Don't tell me words from the second list, just the first list. Go ahead.

Record all responses verbatim, in the order recalled. Prompt only once (e.g., Anything else?) at the end of each free and cued recall trial (i.e., after 15 seconds with no response or when the examinee says he/she cannot remember more words).

List A	Resp Type
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
Total Correct C	
Total Repetitions R	
Total Intrusions I	

List A Short-Delay Cued Recall

Tell me all the words from the first list that are furniture.
Tell me all the words from the first list that are vegetables.
Tell me all the words from the first list that are ways of traveling.
Tell me all the words from the first list that are animals.

Furniture	Resp Type
1	
2	
3	
4	
5	
6	
7	
8	

Ways of Traveling

Ways of Traveling	Resp Type
1	
2	
3	
4	
5	
6	
7	
8	

Total Correct C

Total Intrusions I

Vegetables	Resp Type
1	
2	
3	
4	
5	
6	
7	
8	

Animals

Animals	Resp Type
1	
2	
3	
4	
5	
6	
7	
8	

Total Repetitions R

There should be approximately a **20-minute delay** between the completion of Short-Delay Cued Recall and the start of Long-Delay Free Recall. Do not inform the examinee that there will be later CVLT-II trials.

List A Long-Delay Free Recall

I read two different lists of words to you earlier: a first list that I read to you several times, and a second list that I read to you once. Tell me all the words you can that were from the *first* list. Don't tell me words from the second list, just the first list. Go ahead.

	List A	Resp Type
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Total Correct C

Total Repetitions R

Total Intrusions I

List A Long-Delay Cued Recall

Tell me all the words from the first list that are furniture.

Tell me all the words from the first list that are vegetables.

Tell me all the words from the first list that are ways of traveling.

Tell me all the words from the first list that are animals.

Furniture	Resp Type	Vegetables	Resp Type	Ways of Traveling	Resp Type	Animals	Resp Type
1		1		1		1	
2		2		2		2	
3		3		3		3	
4		4		4		4	
5		5		5		5	
6		6		6		6	
7		7		7		7	
8		8		8		8	

Total Correct C

Total Repetitions R

Total Intrusions I

List A Long-Delay Yes/No Recognition

Now I'm going to read more words to you. After I read each one, say "Yes" if that word was from the first list, or say "No" if it was not from the first list.

If the examinee responds "I don't know" during Yes/No Recognition, say, "Tell me whether you think _____ was on the first list."

	Response	Item Type		Response	Item Type		Response	Item Type		Response	Item Type
wallet	Y N	UN	violin	Y N	BN	dog	Y N	PR	turnip	Y N	BS
boat	Y N	T	cow	Y N	T	bookcase	Y N	T	cabinet	Y N	T
saxophone	Y N	BN	fork	Y N	UN	matches	Y N	UN	onion	Y N	T
cucumber	Y N	BS	bus	Y N	PR	spinach	Y N	T	lion	Y N	PR
giraffe	Y N	T	celery	Y N	T	clarinet	Y N	BN	camera	Y N	UN
carrot	Y N	PR	lamp	Y N	T	truck	Y N	T	guitar	Y N	BN
patio	Y N	BN	radishes	Y N	BS	rabbit	Y N	BS	subway	Y N	T
cabbage	Y N	T	table	Y N	PR	chair	Y N	PR	tiger	Y N	BS
desk	Y N	T	rose	Y N	UN	corn	Y N	BS	coffee	Y N	UN
bracelet	Y N	UN	motorcycle	Y N	T	seashell	Y N	UN	zebra	Y N	T
car	Y N	PR	sheep	Y N	BS	garage	Y N	BN	lettuce	Y N	PR
elephant	Y N	BS	basement	Y N	BN	squirrel	Y N	T	closet	Y N	BN

T = Target

Distractor Types: BS = List B Shared; BN = List B Non-Shared; PR = Prototypical; UN = Unrelated

There should be approximately a 10-minute delay between the completion of Yes/No Recognition and the start of Forced-Choice Recognition. Do not inform the examinee that there will be a later CVLT-II trial.

Total Hits

Total False-Positives

Earlier, I read some lists of words to you, remember? Now I am going to read some words two at a time. After I read both words, say which of the words was from the *first* list, the one I read to you several times. It may be difficult to remember which one to pick, but even if it's hard for you, just try your best. Ready?

Was _____ or _____ on the first list?

If the examinee says "I don't know," say, "I know it may be difficult, but just take your best guess."

Distractor types: C = concrete; A = abstract	Total Hits
--	------------

[illegible]



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Repeatable Battery for the Assessment
of Neuropsychological Status
Christopher Randolph

Record Form A

Subject# _____ Age _____ Sex _____ Education Level _____

Examiner _____ Date of Testing _____ Ethnicity _____

Observations: _____

	Immediate Memory	Visuospatial/ Construction	Language	Attention	Delayed Memory		Total Scale
Index Score							
Confidence Interval %							
Percentile							
Index Score						Percentile Rank	Total Scale Index Score
160						>99.9	160
155						>99.9	155
150						>99.9	150
145						99.9	145
140						99.6	140
135						99	135
130						98	130
125						95	125
120						91	120
115						84	115
110						75	110
105						63	105
100						50	100
95						37	95
90						25	90
85						16	85
80						9	80
75						5	75
70						2	70
65						1	65
60						0.4	60
55						0.1	55
50						<0.1	50
45						<0.1	45
40						<0.1	40

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1 List Learning

Trial 1

Say *I am going to read you a list of words. I want you to listen carefully and, when I finish, repeat back as many words as you can. You don't have to say them in the same order that I do—just repeat back as many words as you can remember, in any order. Okay?*

Trials 2-4

Say *I am going to read the list again. When I finish, repeat back as many words as you can, even if you have already said them before. Okay?*

Record responses in order.

Scoring: 1 point for each word correctly recalled on each trial.

List	Trial 1	Trial 2	Trial 3	Trial 4
Market				
Package				
Elbow				
Apple				
Story				
Carpet				
Bubble				
Highway				
Saddle				
Powder				

Number Correct	+	+	+	=	
	Total Trial 1	Total Trial 2	Total Trial 3	Total Trial 4	Total Score Range=0-40

2 Story Memory

Trial 1

Say ***I am going to read you a short story. I'd like you to listen carefully and, when I finish, repeat back as much of the story as you can remember. Try and use the same wording, if you can. Okay?***

Read the story below, then say ***Now repeat back as much of that story as you can.***

Trial 2

Say ***I am going to read that same story again. When I finish, I want you to again repeat back as much of the story as you can remember. Try to repeat it as exactly as you can.***

Read the story below, then say ***Now repeat back as much of that story as you can.***

Scoring: 1 point for verbatim recall of bold, italic words or alternatives, shown below in color within parentheses. Record intrusions or variations in the Responses column.

Story	Responses	Trial 1 Score (0 or 1)	Trial 2 Score (0 or 1)	Item Score (0-2)
1. On Tuesday ,				
2. May				
3. Fourth ,				
4. in Cleveland , Ohio,				
5. a 3 alarm				
6. fire broke out.				
7. Two				
8. hotels				
9. and a restaurant				
10. were destroyed				
11. before the firefighters (firemen)				
12. were able to extinguish it (put it out) .				
Total Score (Trial 1 + Trial 2) Range=0-24				

3 Figure Copy



Time Limit: 4 minutes

Fold this page back and present the Figure Copy Drawing Page along with the stimulus. Ask the examinee to make an exact copy of the figure. Tell the examinee that he or she is being timed, but that the score is based *only* on the exactness of his or her copy.

Scoring: 1 point for correctness and completeness (drawing), and 1 point for proper placement. See Appendix 1 in Stimulus Booklet A for complete scoring criteria and scoring examples.

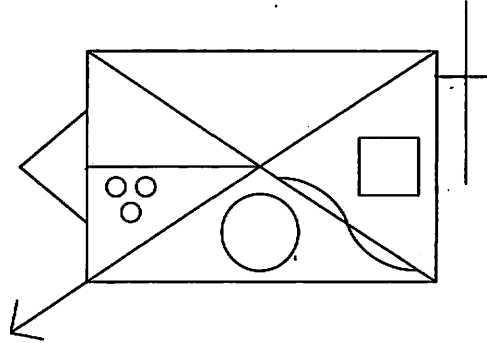


Figure Copy Criteria

(Fold back for use.)

Item	Drawing (0 or 1)	Placement (0 or 1)	Score (0, 1, or 2)	Scoring Criteria
1. rectangle				Drawing: lines are unbroken and straight; angles 90 degrees; top/bottom lines 25% longer than sides Placement: not rotated more than 15 degrees
2. diagonal cross				Drawing: lines are unbroken and straight and should approximately bisect each other Placement: ends of lines should meet corners of the rectangle without significant overlap or measurable distance between the ends of the lines and the corners
3. horizontal line				Drawing: line is unbroken and straight; should not exceed 1/2 the length of the rectangle Placement: should bisect left side of the rectangle at approximately a right angle and intersect the diagonal cross
4. circle				Drawing: round, unbroken and closed; diameter should be approximately 1/4–1/3 height of rectangle Placement: placed in appropriate segment; not touching any other part of figure
5. 3 small circles				Drawing: round, unbroken and closed; equal size; triangular arrangement; not touching each other Placement: in appropriate segment; not touching figure; triangle formed not rotated more than 15 degrees
6. square				Drawing: must be closed; 90 degree angles; lines straight and unbroken; height is 1/4–1/3 height of rectangle Placement: in appropriate segment; not touching any other part of figure; not rotated more than 15 degrees
7. curving line				Drawing: 2 curved segments are approximately equal in length and symmetrical; correct direction of curves Placement: ends of line touch diagonal; do not touch corner of rectangle or intersection of diagonal lines
8. outside cross				Drawing: vertical line of the outside cross is parallel to side of rectangle; >1/2 the height of rectangle; horizontal line crosses vertical at 90 degree angle and is between 20–50% of length of vertical line Placement: horizontal line of outside cross touches rectangle higher than 2/3 the height of rectangle, but below top; does not penetrate the rectangle
9. triangle				Drawing: angle formed by 2 sides of triangle is between 60–100 degrees; sides are straight, unbroken and meet in a point; distance on vertical side of rectangle subsumed by triangle is approximately 50% of the height of vertical side Placement: roughly centered on the left vertical side of the rectangle
10. arrow				Drawing: straight and unbroken; lines forming arrow are approximately equal in length and not more than 1/3 length of staff Placement: must protrude from appropriate corner of rectangle such that staff appears to be continuation of diagonal cross

Total Score
Range=0–20

Figure Copy Drawing Page

(Fold back for use.)

4 Line Orientation



Time Limit: 20 seconds/item

Present the sample item, and say **These two lines down here (indicate) match two of the lines on top. Can you tell me the numbers, or point to the lines that they match?** Correct any errors and make sure the examinee understands the task. Continue with Items 1–10.

Scoring: 1 point for each line correctly identified.

Item	Responses	Correct Responses	Score (0, 1, or 2)
Sample		1, 7	
1.		10, 12	
2.		4, 11	
3.		6, 9	
4.		8, 13	
5.		2, 4	

Item	Responses	Correct Responses	Score (0, 1, or 2)
6.		1, 6	
7.		3, 10	
8.		5, 8	
9.		1, 3	
10.		11, 13	
Total Score Range=0–20			

5 Picture Naming



Time Limit: 20 seconds/item

Ask the examinee to name each picture. Give the semantic cue only if the picture is obviously misperceived.

Scoring: 1 point for each item that is correctly named spontaneously or following semantic cue.

Item	Semantic Cue	Responses	Score (0 or 1)
1. chair	a piece of furniture		
2. pencil	used for writing		
3. well	you get water from it		
4. giraffe	an animal		
5. sailboat	used on the water (if "boat," query "what kind")		
6. cannon	a weapon, used in war		
7. pliers	a tool		
8. trumpet	a musical instrument ("cornet" okay)		
9. clothespin	used to hold laundry on a line		
10. kite	it's flown in the air		
Total Score Range=0–10			

6 Semantic Fluency



Time Limit: 60 seconds

Say **Now I'd like you to tell me the names of all of the different kinds of fruits and vegetables that you can think of. I'll give you one minute to come up with as many as you can. Ready?**

Scoring: 1 point for each correct response.

1. _____	11. _____	21. _____	31. _____
2. _____	12. _____	22. _____	32. _____
3. _____	13. _____	23. _____	33. _____
4. _____	14. _____	24. _____	34. _____
5. _____	15. _____	25. _____	35. _____
6. _____	16. _____	26. _____	36. _____
7. _____	17. _____	27. _____	37. _____
8. _____	18. _____	28. _____	38. _____
9. _____	19. _____	29. _____	39. _____
10. _____	20. _____	30. _____	40. _____

Total Score
Range=0-40

7 Digit Span

Say **I am going to say some numbers, and I want you to repeat them after me. Okay?**

Read the numbers at the rate of 1 per second. Only read the second string in each set if the first string was failed. Discontinue after failure of both strings in any set.

Scoring: 2 points for the first string correct, 1 point for the second string correct, and 0 points for both strings failed.

Item	First String	String Score (0 or 2)	Second String	String Score (0 or 1)	Item Score (0-2)
1.	4-9		5-3		
2.	8-3-5		2-4-1		
3.	7-2-4-6		1-6-3-8		
4.	5-3-9-2-4		3-8-4-9-1		
5.	6-4-2-9-3-5		9-1-5-3-7-6		
6.	2-8-5-1-9-3-7		5-3-1-7-4-9-2		
7.	8-3-7-9-5-2-4-1		9-5-1-4-2-7-3-8		
8.	1-5-9-2-3-8-7-4-6		5-1-9-7-6-2-3-6-5		

Total Score
Range=0-16



Say **Look at these boxes** (indicate key). **For each one of these marks there is a number that goes with it. Down here there are marks, but no numbers. I want you to fill in the number that goes with each mark.**

Demonstrate the first three. Say **Now I would like you to fill in the rest of these boxes up to the double lines** (indicate) **for practice.** Correct any errors as they are made. Make sure that the examinee understands the task and has correctly completed the sample items before you begin timing.

Say **Now I would like you to continue to fill in the numbers that match the marks. Go as quickly as you can without skipping any. When you reach the end of the line, go on to the next one. Ready? Go ahead.**

Redirect the examinee to the task if he or she becomes distracted. If the examinee is unable to comprehend the task, the subtest score is 0.

Scoring: 1 point for each item correctly coded within 90 seconds (*do not* score the sample items).

Note: Familiarize yourself with these instructions before administering this subtest.

Total Score
Range=0–89

--

9 List Recall

Say *Do you remember the list of words that I read to you in the beginning? Tell me as many of those words as you can remember now.*

Scoring: 1 point for each word correctly recalled.

List (Do not read.)	Response	Score (0 or 1)
Market		
Package		
Elbow		
Apple		
Story		
Carpet		
Bubble		
Highway		
Saddle		
Powder		

Total Score
Range=0–10

10 List Recognition

Say *I'm going to read you some words. Some of these words were on that list, and some of them weren't. I want you to tell me which words were on the list.* For each word, ask *Was _____ on the list?*

Scoring: 1 point for each word correctly identified. Circle the letter corresponding to examinee's response (y = yes, n = no); bold, capitalized (Y, N) letter indicates correct response.

List	Circle One	List	Circle One	List	Circle One	List	Circle One
1. Apple	Y n	6. sailor	y N	11. Bubble	Y n	16. Saddle	Y n
2. honey	y N	7. velvet	y N	12. prairie	y N	17. Powder	Y n
3. Market	Y n	8. Carpet	Y n	13. Highway	Y n	18. angel	y N
4. Story	Y n	9. valley	y N	14. oyster	y N	19. Package	Y n
5. fabric	y N	10. Elbow	Y n	15. student	y N	20. meadow	y N

Total Score
Range=0–20

11 Story Recall

Say: *Do you remember that story about a fire that I read to you earlier? Tell me as many details from the story as you can remember now.*

Scoring: 1 point for each verbatim recall of bold, italic words or alternatives, shown below in color within parentheses. Record intrusions or variations in the Responses column.

Story (Do not read.)	Responses	Item Score (0 or 1)
1. On Tuesday ,		
2. May		
3. Fourth ,		
4. in Cleveland , Ohio,		
5. a 3 alarm		
6. fire broke out.		
7. Two		
8. hotels		
9. and a restaurant		
10. were destroyed		
11. before the firefighters (firemen)		
12. were able to extinguish it (put it out) .		
Total Score Range=0-12		

12 Figure Recall

Say *Do you remember that figure that I had you copy? I want you to draw as much of it as you can remember now. If you remember a part, but you're not sure where it goes, put it anywhere. Try to draw as much of it as you can.*

Now, present the Figure Recall Drawing Page.

Scoring: 1 point for correctness and completeness (drawing), and 1 point for proper placement. See Appendix 1 in Stimulus Booklet.A for complete scoring criteria and scoring examples.

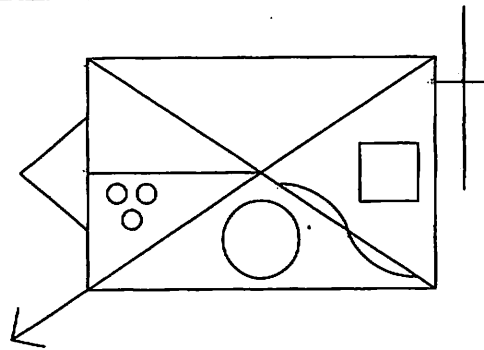


Figure Recall Criteria

(Fold back for use.)

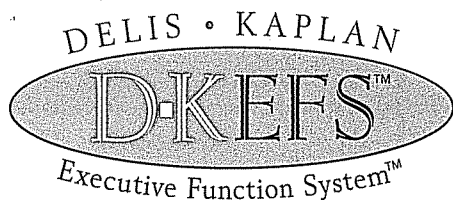
Item	Drawing (0 or 1)	Placement (0 or 1)	Score (0, 1, or 2)	Scoring Criteria
1. rectangle				Drawing: lines are unbroken and straight; angles 90 degrees; top/bottom lines 25% longer than sides Placement: not rotated more than 15 degrees
2. diagonal cross				Drawing: lines are unbroken and straight and should approximately bisect each other Placement: ends of lines should meet corners of the rectangle without significant overlap or measurable distance between the ends of the lines and the corners
3. horizontal line				Drawing: line is unbroken and straight; should not exceed 1/2 the length of the rectangle Placement: should bisect left side of the rectangle at approximately a right angle and intersect the diagonal cross
4. circle				Drawing: round, unbroken and closed; diameter should be approximately 1/4–1/3 height of rectangle Placement: placed in appropriate segment; not touching any other part of figure
5. 3 small circles				Drawing: round, unbroken and closed; equal size; triangular arrangement; not touching each other Placement: in appropriate segment; not touching figure; triangle formed not rotated more than 15 degrees
6. square				Drawing: must be closed; 90 degree angles; lines straight and unbroken; height is 1/4–1/3 height of rectangle Placement: in appropriate segment; not touching any other part of figure; not rotated more than 15 degrees
7. curving line				Drawing: 2 curved segments are approximately equal in length and symmetrical; correct direction of curves Placement: ends of line touch diagonal; do not touch corner of rectangle or intersection of diagonal lines
8. outside cross				Drawing: vertical line of the outside cross is parallel to side of rectangle; >1/2 the height of rectangle; horizontal line crosses vertical at 90 degree angle and is between 20–50% of length of vertical line Placement: horizontal line of outside cross touches rectangle higher than 2/3 the height of rectangle, but below top; does not penetrate the rectangle
9. triangle				Drawing: angle formed by 2 sides of triangle is between 60–100 degrees; sides are straight, unbroken and meet in a point; distance on vertical side of rectangle subsumed by triangle is approximately 50% of the height of vertical side Placement: roughly centered on the left vertical side of the rectangle
10. arrow				Drawing: straight and unbroken; lines forming arrow are approximately equal in length and not more than 1/3 length of staff Placement: must protrude from appropriate corner of rectangle such that staff appears to be continuation of diagonal cross

Total Score
Range=0–20

Figure Recall Drawing Page

(Fold back for use.)

A large, empty rectangular box with a thin black border, occupying the majority of the page below the header. It is intended for a drawing that represents a recalled figure.



Delis-Kaplan Executive Function System

Dean C. Delis Edith Kaplan Joel H. Kramer

Standard Record Form

ID: _____ Examiner: _____

Sex: ☐ F ☐ M Handedness: ☐ R ☐ L ☐ Ambidextrous

Highest Level of Education (years): _____

Current Grade (if applicable): _____

School (if applicable): _____

	Year	Month	Day
Date Tested			
Age at Testing			

Referral Source/Reason for Referral/Presenting Complaints: _____

Attitude Toward Testing: _____

Affect and Mood: _____

Unusual Behaviors and Comments: _____

Physical Appearance: _____

Visual/Auditory/Motor Problems: _____

Language Background: _____

Diagnostic History: _____

Current Medications: _____



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Product Number 0154091154

D-KEFS Trail Making Test: Summary of Scores

Primary Measures: Completion Times

The diagram illustrates the scaling process for five conditions. Each condition is represented by a box labeled 'Raw Score' and a box labeled 'Scaled Score', connected by a right-pointing arrow. The conditions are:

- Condition 1: Visual Scanning**
- Condition 2: Number Sequencing**
- Condition 3: Letter Sequencing**
- Condition 4: Number-Letter Switching**
- Condition 5: Motor Speed**

Primary Combined Measure: Completion Times

Combined Number Sequencing + Letter Sequencing

Number Sequencing + Letter Sequencing = Sum of Scaled Scores → Composite Scaled Score

Scaled Score Scaled Score Sum of Scaled Scores

Primary Contrast Measures: Completion Times

	Switching: Scaled Score		Scaled Score		Scaled Score Difference		Contrast Scaled Score*
Number–Letter Switching vs. Visual Scanning*	<input type="text"/>	–	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>
Number–Letter Switching vs. Number Sequencing*	<input type="text"/>	–	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>
Number–Letter Switching vs. Letter Sequencing*	<input type="text"/>	–	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>
Number–Letter Switching vs. Combined Number Sequencing + Letter Sequencing*	<input type="text"/>	–	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>
Number–Letter Switching vs. Motor Speed*	<input type="text"/>	–	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>

* A low or high contrast scaled score may reflect different cognitive problems; see examiner's manual.

Optional Measures: Error Analysis

Condition 1: Visual Scanning

Condition 2: Number Sequencing

Condition 3: Letter Sequencing

Condition 4: Number-Letter Switching

Condition 5: Motor Speed

Omission Errors

Commission Errors

Sequencing Errors

Set-Loss Errors

Time-Discontinue Errors

Condition 4: All Error Types

Total Raw Score

Scaled Score

Note: Cumulative percentile ranks for the D-KEFS were scaled to reflect the percentage of the normative sample that obtained raw scores equal to or worse than the raw score obtained by the examinee.

D-KEFS Verbal Fluency Test

Condition 1: Letter Fluency

	F	A	S	
First Interval: 1–15 Seconds	1"–15" <input type="text"/>	1"–15" <input type="text"/>	1"–15" <input type="text"/>	1"–15" F + A + S Correct Responses <input type="text"/>
Second Interval: 16–30 Seconds	16"–30" <input type="text"/>	16"–30" <input type="text"/>	16"–30" <input type="text"/>	16"–30" F + A + S Correct Responses <input type="text"/>
Third Interval: 31–45 Seconds	31"–45" <input type="text"/>	31"–45" <input type="text"/>	31"–45" <input type="text"/>	31"–45" F + A + S Correct Responses <input type="text"/>
Fourth Interval: 46–60 Seconds	46"–60" <input type="text"/>	46"–60" <input type="text"/>	46"–60" <input type="text"/>	46"–60" F + A + S Correct Responses <input type="text"/>
	F Total Correct Responses <input type="text"/> Total Set-Loss Errors <input type="text"/> Total Repetition Errors <input type="text"/>	A Total Correct Responses <input type="text"/> Total Set-Loss Errors <input type="text"/> Total Repetition Errors <input type="text"/>	S Total Correct Responses <input type="text"/> Total Set-Loss Errors <input type="text"/> Total Repetition Errors <input type="text"/>	1"–60" <input type="text"/> Letter Fluency: Total Correct Raw Score
Letter Fluency: Total Responses* (Correct + Incorrect) <input type="text"/>				

* Note: Some repetition errors are coded also as set-loss errors; each double-coded error counts as only one response for the total responses measure.

D-KEFS Verbal Fluency Test (continued)

Condition 2: Category Fluency

Animals

First Interval: 1-15 Seconds	1"-15" <input type="text"/>
Second Interval: 16-30 Seconds	16"-30" <input type="text"/>
Third Interval: 31-45 Seconds	31"-45" <input type="text"/>
Fourth Interval: 46-60 Seconds	46"-60" <input type="text"/>

Animals	
Total Correct Responses	<input type="text"/>
Total Set-Loss Errors	<input type="text"/>
Total Repetition Errors	<input type="text"/>

Category Fluency: Total Responses
(Correct + Incorrect)*

Boys' Names

1"-15" <input type="text"/>	1"-15" <input type="text"/>	1"-15" Animals + Boys' Names Correct Responses <input type="text"/>
16"-30" <input type="text"/>	16"-30" <input type="text"/>	16"-30" Animals + Boys' Names Correct Responses <input type="text"/>
31"-45" <input type="text"/>	31"-45" <input type="text"/>	31"-45" Animals + Boys' Names Correct Responses <input type="text"/>
46"-60" <input type="text"/>	46"-60" <input type="text"/>	46"-60" Animals + Boys' Names Correct Responses <input type="text"/>

Boys' Names		1"-60" <input type="text"/>
Total Correct Responses	<input type="text"/>	Category Fluency: Total Correct Raw Score
Total Set-Loss Errors	<input type="text"/>	
Total Repetition Errors	<input type="text"/>	

D-KEFS Verbal Fluency Test (continued)

Condition 3: Category Switching

Fruits / Furniture

First
Interval:
1-15
Seconds

1"-15"
Fruits
+
Furniture
Correct
Responses*

Second
Interval:
16-30
Seconds

16"-30"
Fruits
+
Furniture
Correct
Responses*

Third
Interval:
31-45
Seconds

31"-45"
Fruits
+
Furniture
Correct
Responses*

Fourth
Interval:
46-60
Seconds

46"-60"
Fruits
+
Furniture
Correct
Responses*

Category Switching:
Total Switching
Accuracy

Fruits
Total Correct
Responses*

+

Furniture
Total Correct
Responses*

=

1"-60"
 Category Switching:
Total Correct Responses*
Raw
Score

* Correct responses are summed
independent of switching accuracy.

Total Set-Loss Errors

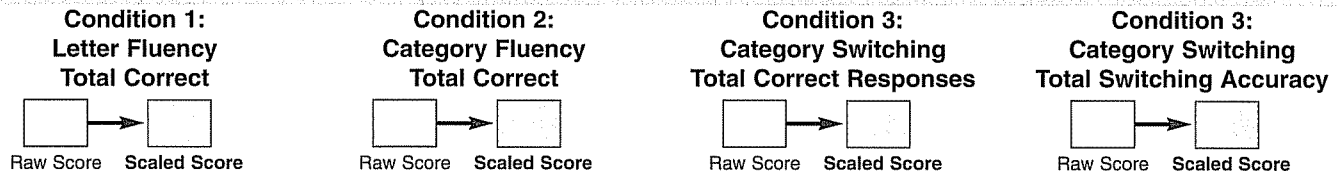
Total Repetition Errors

Category Switching:
Total Responses (Correct + Incorrect)**

** Note: Some repetition errors are coded also as set-loss errors; each double-coded error counts as only one response for the total responses measure.

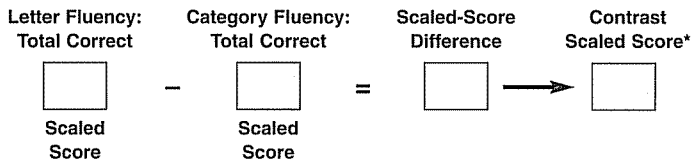
D-KEFS Verbal Fluency Test: Summary of Scores

Primary Measures

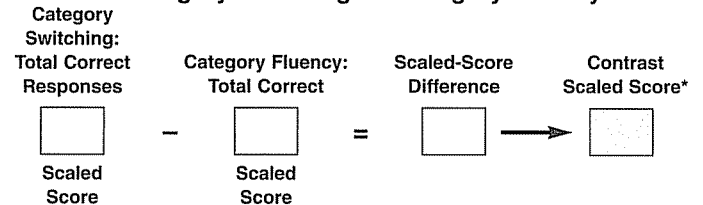


Primary Contrast Measures

Letter Fluency vs. Category Fluency*



Category Switching vs. Category Fluency*



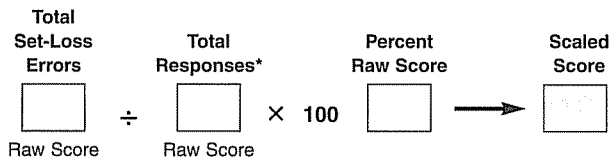
* A low or high contrast scaled score may reflect different cognitive problems; see examiner's manual.

Optional Measures: Conditions 1-3 Combined

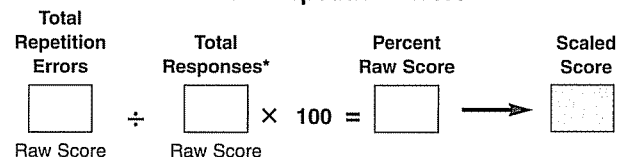
	Condition 1: Letter Fluency Raw Score		Condition 2: Category Fluency Raw Score		Condition 3: Category Switching Raw Score		Total Raw Score	Scaled Score
First Interval (1"-15"): Total Correct	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	<input type="text"/>
Second Interval (16"-30"): Total Correct	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	<input type="text"/>
Third Interval (31"-45"): Total Correct	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	<input type="text"/>
Fourth Interval (46"-60"): Total Correct	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	<input type="text"/>
Set-Loss Errors	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	<input type="text"/>
Repetition Errors	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	<input type="text"/>
Total Responses (Correct + Incorrect)*	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	

* Note: Some repetition errors are coded also as set-loss errors; each double-coded error counts as only one response for the total responses measure.

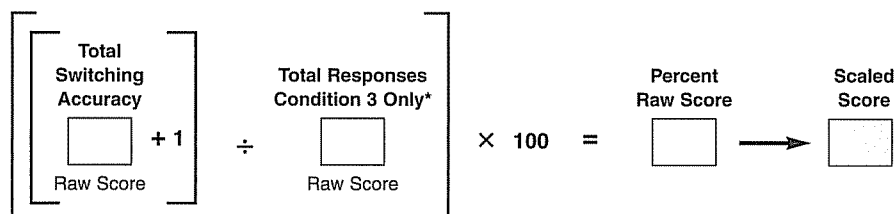
Percent Set-Loss Errors



Percent Repetition Errors



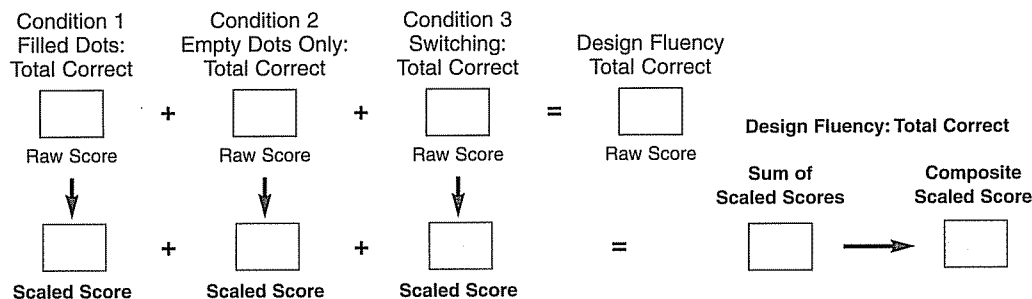
Category Switching: Percent Switching Accuracy (Condition 3 Only)



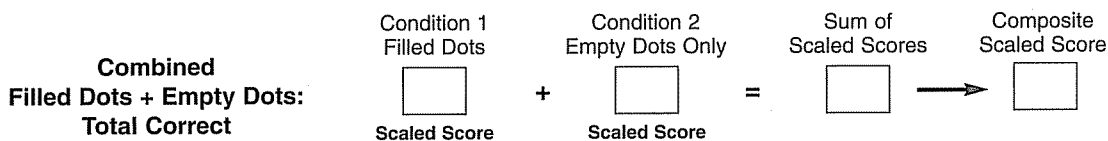
* Note: Some repetition errors are coded also as set-loss errors; each double-coded error counts as only one response for the total responses measure.

D-KEFS Design Fluency Test: Summary of Scores

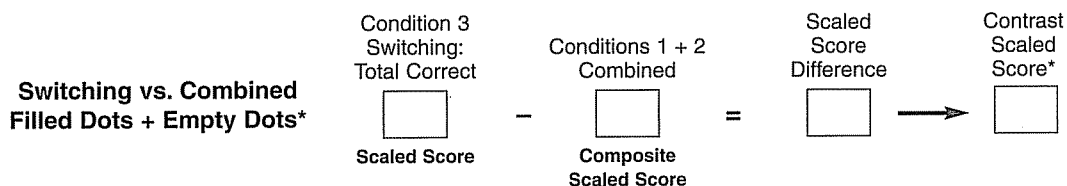
Primary Measures



Primary Combined Measure: Filled Dots + Empty Dots

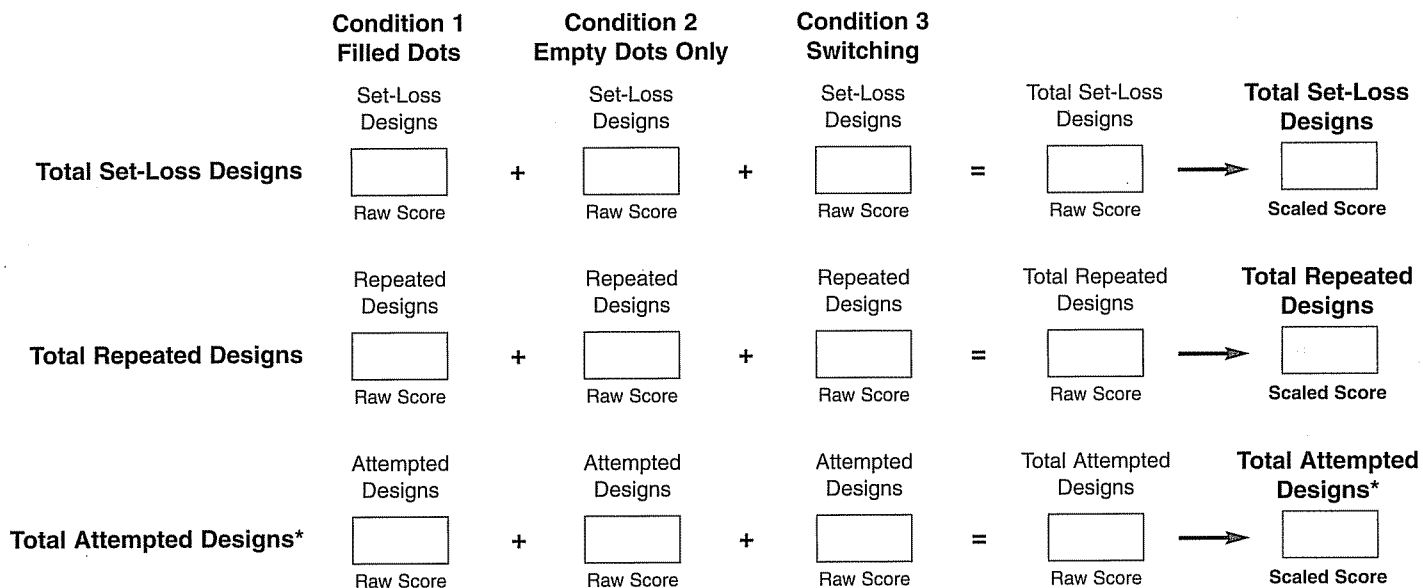


Primary Contrast Measure

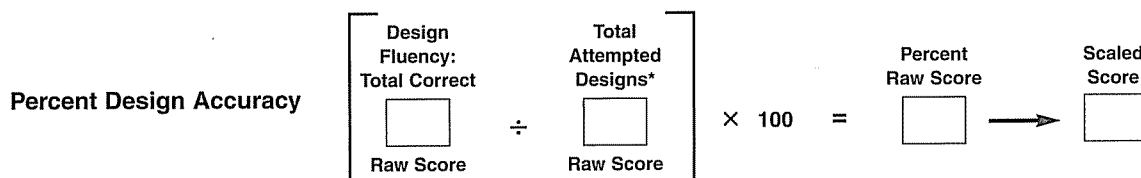


* A low or high contrast scaled score may reflect different cognitive problems; see examiner's manual.

Optional Measures



* *Note:* Some repetition errors are coded also as set-loss errors; each double-coded error counts as only one response for the total attempted designs measure.



D-KEFS Color-Word Interference Test

Ages 8–89

Materials: Record Form, Stimulus Booklet (Flat Position), Stopwatch

Condition 1: Color Naming

Discontinue

Discontinue if the examinee has marked difficulty or makes four uncorrected errors on the practice lines. Otherwise, discontinue the scored task after 90 seconds.

Administration and Recording

Place the stimulus booklet flat on the table in a horizontal (landscape) position directly in front of the examinee so that the two practice lines of Condition 1 are positioned at the top of the page from the examinee's perspective. Say,

This page has patches of color on it. I'd like you to say the colors as quickly as you can without skipping any or making mistakes. When you finish this line (sweep across the first practice line of five squares with your finger), go on to this one (point to the first square of the second row). Now try these first two lines for practice.

If the examinee is able to complete the two practice lines, say, **Good. Now, when I say begin, I want you to say the rest of the colors. Begin here** (point to the first square on the first line of 10 squares below the practice lines) **and say each color, one after the other, without skipping any. When you finish this line (sweep across the first row with your finger), go on to this one** (point to the first square of the second row). **Keep saying the colors until you reach the end of the last line (point). Say the colors as quickly as you can without making mistakes. Ready? Begin.**

Start timing. Follow the examinee's progress item by item. Record errors by writing the first letter of the incorrect color name beneath the correct response and record any nonsense words (e.g., "bleen") verbatim. Indicate self-corrections by drawing a slash mark through the letter or word. Record total completion time in seconds.

Allow the examinee to use a finger to maintain his or her place on the stimulus page. If the examinee skips a line accidentally, point out the error immediately and redirect the examinee to the correct line. Keep the stopwatch running while pointing out line-skipping errors.

If the examinee does not complete the task at the end of 90 seconds, say, **Stop.** Indicate the last item attempted and record 90 seconds as the total completion time. Items to which the examinee did not respond because the time limit was reached are not counted as errors. Turn the page in the stimulus booklet to Condition 2: Word Reading.

			green	red	blue	green	blue		
			red	blue	green	blue	green		
red	blue	red	green	red	blue	green	blue	red	green
blue	green	red	green	red	green	blue	red	blue	green
red	green	blue	red	green	red	green	blue	green	red
blue	red	green	blue	red	green	blue	red	blue	green
red	blue	red	green	blue	green	blue	red	blue	green

Condition 1: Color Naming

Total
Uncorrected
Errors

Total
Self-Corrected
Errors

Total
Time To
Complete

D-KEFS Color-Word Interference Test (continued)

Condition 2: Word Reading

Discontinue

Discontinue if the examinee has marked difficulty or makes four uncorrected errors on the two practice lines. Otherwise, discontinue the scored task after 90 seconds.

Administration and Recording

Place the stimulus booklet flat on the table in a horizontal (landscape) position directly in front of the examinee, with the rows of words printed in black ink facing the examinee. Say,

Now look at this page with words printed on it. I'd like you to read the words aloud as quickly as you can without skipping any or making mistakes. When you finish this line (sweep across the first practice line of five words with your finger), go on to this one (point to the first word of the second row). Now try reading these first two lines for practice.

If the examinee is able to complete the two practice lines, say,

Good. Now, when I say begin, I want you to read the rest of the words. Begin here (point to the first word on the first line of 10 words below the practice lines) and read each word, one after the other, without skipping any. Keep reading the words until you reach the end (point to the last word on the last line). Read the words as quickly as you can without making mistakes. Ready? Begin.

Start timing. Follow the examinee's progress item by item. Record errors by writing the first letter of the incorrect word beneath the correct response and record any nonsense words (e.g., "bleen") verbatim. Indicate self-corrections by drawing a slash mark through the letter or word. Record total completion time in seconds.

Allow the examinee to use a finger to maintain his or her place on the stimulus page. If the examinee skips a line accidentally, point out the error immediately and redirect the examinee to the correct line. Keep the stopwatch running while pointing out line-skipping errors.

If the examinee does not complete the task at the end of 90 seconds, say, **Stop**. Indicate the last item attempted and record 90 seconds as the total completion time. Items to which the examinee did not respond because the time limit was reached are not counted as errors. Turn the page in the stimulus booklet to Condition 3: Inhibition.

			red	blue	green	red	blue		
			green	blue	green	red	green		
green	red	blue	green	blue	red	blue	green	blue	green
red	green	blue	green	blue	green	red	blue	red	green
red	green	blue	green	red	blue	green	red	blue	red
blue	green	red	blue	green	red	blue	green	blue	red
green	red	blue	red	blue	green	red	blue	red	green

Condition 2: Word Reading

Total
Uncorrected
Errors

Total
Self-Corrected
Errors

Total
Time To
Complete

Color

D-KEFS Color-Word Interference Test (continued)

Condition 3: Inhibition

Discontinue

Discontinue if the examinee has marked difficulty or requires four corrections on the two practice lines. Otherwise, discontinue the scored task after 180 seconds.

Administration and Recording

Place the stimulus booklet flat on the table in a horizontal (landscape) position directly in front of the examinee, with the rows of words printed in dissonant ink colors facing the examinee. Say,

Now look at this page. It's going to be a little harder than the other pages because the color names are printed in a different-colored ink. For example (point to the first word on the first practice line of five words), do you see how the word *red* is printed in *green* ink here? This time, you are to name *the color of the ink* that the letters are printed in and *not read the word*. So, what would you say for this one? (Point again to the first word on the first practice line and allow the examinee to respond. Correct any errors.) **Good.** And this one? (Point to the next two practice items. Correct any errors.) **Good.** Now try these first two lines for practice.

If the examinee has difficulty understanding the task, you may demonstrate it by naming the ink colors on the first practice line, then inviting the examinee to respond to the second line. If the examinee requires four corrections on the two practice lines, discontinue this condition and do not administer Condition 4: Inhibition/Switching.

If the examinee is able to complete the two practice lines, say,

Good. Now, when I say begin, I want you to do the same thing for the rest of them. Say the color of the ink the letters are printed in; do not read the words. Begin here (point to the first word on the first line of 10 words below the practice lines) and say each ink color, one after the other, without skipping any. Keep saying the ink colors until you reach the end (point to the last word of the last line). Say the ink colors as quickly as you can without making mistakes. Ready? Begin.

Start timing. Follow the examinee's progress item by item. The single letter (*r* for red, *b* for blue, *g* for green) printed in parentheses next to each correct response represents the error response if the examinee reads the word rather than naming the ink color. Record errors by circling the letter or by writing the initial letter of other incorrect colors beneath the correct response. Also record any nonsense words (e.g., "bleen") verbatim. Indicate self-corrections by drawing a slash through the letter or word. Record total completion time in seconds.

Allow the examinee to use a finger to maintain his or her place on the stimulus page. If the examinee skips a line accidentally, point out the error immediately and redirect the examinee to the correct line. Keep the stopwatch running while pointing out line-skipping errors.

If the examinee makes three consecutive errors of reading the words, prompt him or her to name the ink color. Provide this prompt only once during this condition and keep the stopwatch running.

If the examinee does not complete the task at the end of 180 seconds, say, **Stop**. Indicate the last item attempted and record 180 seconds as the total completion time. Items to which the examinee did not respond because the time limit was reached are not counted as errors. Turn the page in the stimulus booklet to Condition 4: Inhibition/Switching.

green(r) red(b) blue(g) green(b) red(g)

blue(r) red(b) green(r) red(g) green(r)

red(b) blue(g) red(b) green(r) red(b) blue(r) green(b) blue(r) red(b) green(r)

red(b) blue(g) green(b) blue(g) green(r) blue(g) red(b) green(r) red(b) blue(g)

green(r) blue(g) green(r) red(b) blue(g) green(r) red(g) blue(r) green(b) red(g)

green(b) blue(g) red(b) green(r) blue(g) red(b) green(r) blue(g) green(r) red(g)

blue(g) green(b) blue(r) red(b) blue(g) green(r) red(b) blue(g) green(r) red(b)

Condition 3: Inhibition

Total
Uncorrected
Errors

Total
Self-Corrected
Errors

Total
Time To
Complete

D-KEFS Color-Word Interference Test (continued)

Condition 4: Inhibition/Switching

Discontinue

Do not administer Condition 4 if the examinee had marked difficulty or did not finish before the time limit was reached on Condition 3: Inhibition. Discontinue if the examinee has marked difficulty or requires four corrections on the practice lines of Condition 4. Otherwise, discontinue the scored task after 180 seconds.

Administration and Recording

Place the stimulus booklet flat on the table in a horizontal (landscape) position directly in front of the examinee, with the rows of words printed in dissonant ink colors, half of which are contained in rectangles, facing the examinee. Say,

This is the fourth and last page. This time, for many of the words, you are to do the same thing you just did: Name the color of the ink and do not read the words. But if a word is inside a little box, you should read the word and not name the ink color. (Point to the first three items in the first practice line of five words.) **For example, what would you say for these first three words?** (Allow the examinee to respond and provide corrections if necessary.) **Good. Now try these first two lines for practice.**

If the examinee has difficulty understanding the task, you may demonstrate it by responding to the items on the first practice line, then inviting the examinee to respond to the second line. If the examinee requires four corrections on the two practice lines, discontinue this condition. If the examinee is able to complete the practice lines, say,

Very good. Now, when I say begin, I want you to do the same thing for the rest of them. Say the color of the ink the letters are printed in or read the word if it is in a box. Begin here (point to the first word on the first line of 10 words below the practice lines) **and keep going until you reach the end** (point to the last word of the last line). **Say the ink colors or words as quickly as you can without making mistakes. Ready? Begin.**

Start timing. Follow the examinee's progress item by item. The single letter (*r* for red, *b* for blue, *g* for green) printed in parentheses next to each correct response represents the error response if the examinee either (a) reads the word rather than naming the ink color for an item not contained in a rectangle or (b) names the ink color rather than reading the word for an item contained in a rectangle. Record errors by circling the letter or by writing the initial letter of other incorrect colors beneath the correct response. Also record any nonsense words (e.g., "bleen") verbatim. Indicate self-corrections by drawing a slash through the letter or word. Record total completion time in seconds.

Allow the examinee to use a finger to maintain his or her place on the stimulus page. If the examinee skips a line accidentally, point out the error immediately and redirect the examinee to the correct line. Keep the stopwatch running while pointing out line-skipping errors.

If the examinee makes three consecutive errors, prompt him or her either to name the ink color or to read the word in the rectangle. Provide this prompt only once during this condition and keep the stopwatch running.

If the examinee does not complete the task at the end of 180 seconds, say, **Stop**. Indicate the last item attempted and record 180 seconds as the total completion time. Items to which the examinee did not respond because the time limit was reached are not counted as errors.

				red(b)	blue(r)	green(r)	blue(r)	green(b)		
				blue(g)	red(g)	blue(g)	green(r)	blue(r)		
red(g)	blue(g)	red(g)	green(b)	red(b)	green(r)	blue(r)	green(r)	green(r)	blue(r)	
red(b)	blue(r)	green(r)	red(g)	blue(g)	red(g)	green(b)	red(b)	green(r)	blue(r)	
green(b)	blue(r)	green(r)	red(g)	blue(r)	green(r)	green(b)	red(b)	green(b)	red(b)	
red(b)	green(b)	red(b)	green(b)	red(g)	blue(r)	green(r)	blue(r)	blue(g)	red(g)	
green(r)	red(g)	blue(r)	red(b)	green(b)	red(b)	blue(r)	green(r)	blue(g)	red(g)	

Condition 4: Inhibition/Switching

Total
Uncorrected
Errors

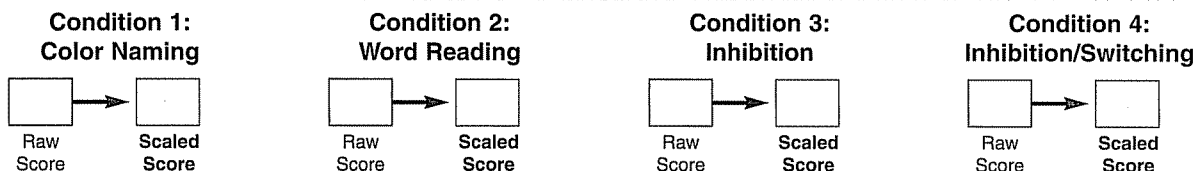
Total
Self-Corrected
Errors

Total
Time To
Complete

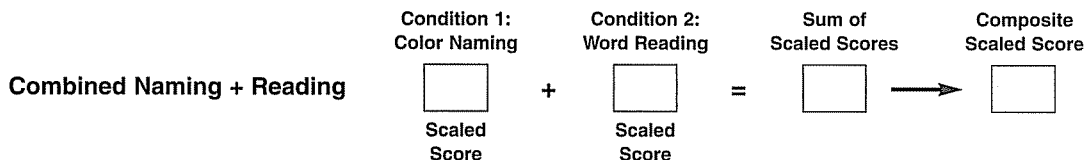
Color

D-KEFS Color-Word Interference Test: Summary of Scores

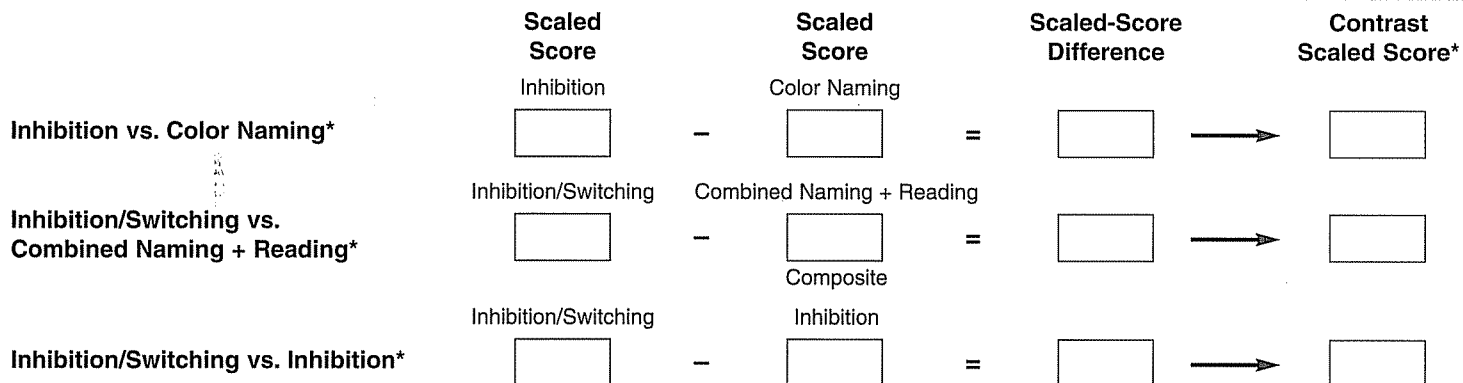
Primary Measures: Completion Times



Primary Combined Measure: Completion Times

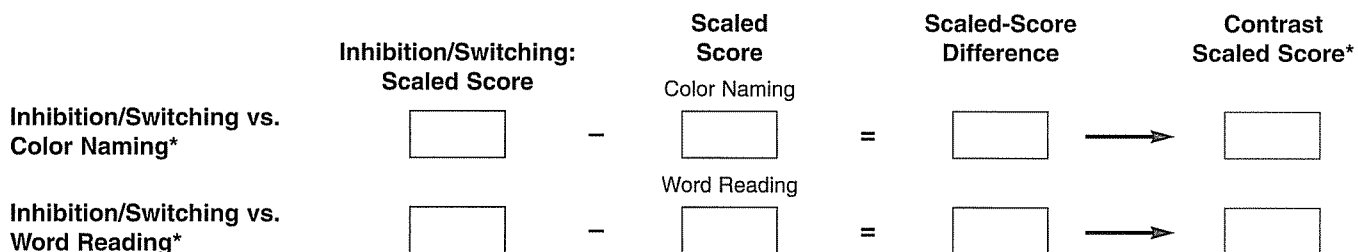


Primary Contrast Measures: Completion Times



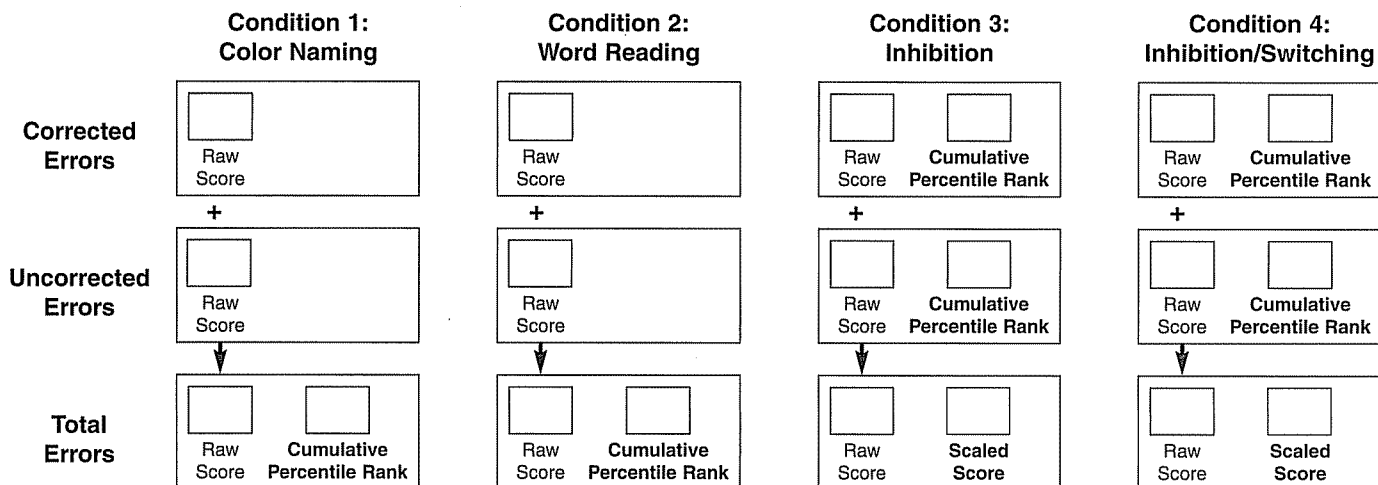
* A low or high contrast scaled score may reflect different cognitive problems; see examiner's manual.

Optional Contrast Measures: Completion Times



* A low or high contrast scaled score may reflect different cognitive problems; see examiner's manual.

Optional Measures: Error Analysis



Note: Cumulative percentile ranks for the D-KEFS were scaled to reflect the percentage of the normative sample that obtained raw scores equal to or worse than the raw score obtained by the examinee.

D-KEFS Sorting Test

Screening Pretest

Words Incorrectly Read: _____ Raw Score: _____

Words Not Understood: _____ Raw Score: _____

Condition 1—Free Sorting: Card Set 1

Discontinue administration of Card Set 1 after either (a) the examinee indicates that he or she cannot identify any more sorts, even after receiving the single prompt to keep trying; (b) 240 seconds (4 minutes) of cumulative **sorting** time have elapsed; or (c) the examinee has completed 10 attempted sorts.

First Sort

Description:

Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an **incorrect** sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Second Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an **incorrect** sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Third Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an **incorrect** sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Free Sorting: Card Set 1 (continued)

Fourth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Fifth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Sixth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Seventh Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Free Sorting: Card Set 1 (continued)

Eighth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Ninth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Tenth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Animals	Air	1 Syllable
Transportation	Land	2 Syllables

Verbal Sorts

Large	Curved	Uppercase	Blue	White
Small	Straight	Lowercase	Yellow	Red

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Airplane Bus Car Duck Eagle Tiger

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Free Sorting: Card Set 1

Raw Score

Total Description Score

Number of Confirmed Correct Sorts

Condition 1—Free Sorting: Card Set 2

Discontinue administration of Card Set 2 after either (a) the examinee indicates that he or she cannot identify any more sorts, even after receiving the single prompt to keep trying; (b) 240 seconds (4 minutes) of cumulative **sorting** time have elapsed; or (c) the examinee has completed 10 attempted sorts.

First Sort

Description:

Sorting Time
(Seconds)

Sort:

Clothing	Head	Plural	Filled Triangles	Cursive	Slope Up	Triangles Above	Diagonals Close
Body Parts	Feet	Singular	Empty Triangles	Printed	Slope Down	Triangles Below	Diagonals Apart

Verbal Sorts

Perceptual Sorts

For an **incorrect** sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Second Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Clothing	Head	Plural	Filled Triangles	Cursive	Slope Up	Triangles Above	Diagonals Close
Body Parts	Feet	Singular	Empty Triangles	Printed	Slope Down	Triangles Below	Diagonals Apart

Verbal Sorts

Perceptual Sorts

For an **incorrect** sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Third Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Clothing	Head	Plural	Filled Triangles	Cursive	Slope Up	Triangles Above	Diagonals Close
Body Parts	Feet	Singular	Empty Triangles	Printed	Slope Down	Triangles Below	Diagonals Apart

Verbal Sorts

Perceptual Sorts

For an **incorrect** sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Free Sorting: Card Set 2 (continued)

Fourth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Clothing Body Parts	Head Feet	Plural Singular	Filled Triangles Empty Triangles	Cursive Printed	Slope Up Slope Down	Triangles Above Triangles Below	Diagonals Close Diagonals Apart
------------------------	--------------	--------------------	-------------------------------------	--------------------	------------------------	------------------------------------	------------------------------------

Verbal Sorts

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Fifth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Clothing Body Parts	Head Feet	Plural Singular	Filled Triangles Empty Triangles	Cursive Printed	Slope Up Slope Down	Triangles Above Triangles Below	Diagonals Close Diagonals Apart
------------------------	--------------	--------------------	-------------------------------------	--------------------	------------------------	------------------------------------	------------------------------------

Verbal Sorts

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Sixth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Clothing Body Parts	Head Feet	Plural Singular	Filled Triangles Empty Triangles	Cursive Printed	Slope Up Slope Down	Triangles Above Triangles Below	Diagonals Close Diagonals Apart
------------------------	--------------	--------------------	-------------------------------------	--------------------	------------------------	------------------------------------	------------------------------------

Verbal Sorts

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Seventh Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Clothing Body Parts	Head Feet	Plural Singular	Filled Triangles Empty Triangles	Cursive Printed	Slope Up Slope Down	Triangles Above Triangles Below	Diagonals Close Diagonals Apart
------------------------	--------------	--------------------	-------------------------------------	--------------------	------------------------	------------------------------------	------------------------------------

Verbal Sorts

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Free Sorting: Card Set 2 (continued)

Eighth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Clothing	Head	Plural
Body Parts	Feet	Singular

Filled Triangles	Cursive	Slope Up	Triangles Above	Diagonals Close
Empty Triangles	Printed	Slope Down	Triangles Below	Diagonals Apart

Verbal Sorts

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Ninth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Clothing	Head	Plural
Body Parts	Feet	Singular

Filled Triangles	Cursive	Slope Up	Triangles Above	Diagonals Close
Empty Triangles	Printed	Slope Down	Triangles Below	Diagonals Apart

Verbal Sorts

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Tenth Sort

Description:

Cumulative
Sorting Time
(Seconds)

Sort:

Clothing	Head	Plural
Body Parts	Feet	Singular

Filled Triangles	Cursive	Slope Up	Triangles Above	Diagonals Close
Empty Triangles	Printed	Slope Down	Triangles Below	Diagonals Apart

Verbal Sorts

Perceptual Sorts

For an *incorrect* sort, mark the cards of one group: Ears Hat Mouth Shoe Socks Toes

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

PRIMARY SORTING MEASURE

Confirmed Correct Sort	Y
------------------------	---

OPTIONAL SORTING MEASURES

Repeated Sort	Y
Unconfirmed Target Sort	Y
Set-Loss Sort	Y
Nontarget Even Sort	Y
Sort Type	V P

Free Sorting: Card Set 2

Raw Score

Total Description Score

Number of Confirmed Correct Sorts

Condition 2—Sort Recognition: Card Set 1

Administer all eight target sorts to the examinee. Discontinue administration of **each sort** after either (a) the examinee provides a correct or incorrect description, (b) the examinee indicates that he or she cannot identify the sorting rules, or (c) 45 seconds have elapsed after the examiner made the sort and the examinee failed to initiate a description response.

First Sort

Perceptual Sort

RULE

Small Cards Large Cards
(Bus Car Eagle) (Airplane Duck Tiger)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Second Sort

Verbal Sort

RULE

Animals Transportation
(Duck Eagle Tiger) (Airplane Bus Car)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Third Sort

Perceptual Sort

RULE

Straight Outer Edges Curved Outer Edges
(Airplane Bus Tiger) (Car Duck Eagle)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Fourth Sort

Verbal Sort

RULE

One-Syllable Words Two-Syllable Words
(Bus Car Duck) (Airplane Eagle Tiger)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Fifth Sort

Perceptual Sort

RULE

Blue Cards Yellow Cards
(Bus Duck Tiger) (Airplane Car Eagle)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Condition 2—Sort Recognition: Card Set 2

Administer all eight target sorts to the examinee. Discontinue administration of **each sort** after either (a) the examinee provides a correct or incorrect description, (b) the examinee indicates that he or she cannot identify the sorting rules, or (c) 45 seconds have elapsed after the examiner made the sort and the examinee failed to initiate a description response.

First Sort

Perceptual Sort

RULE

Diagonals Close Diagonals Apart
(Ears Shoe Socks) (Hat Mouth Toes)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Second Sort

Verbal Sort

RULE

Body Parts Clothing
(Ears Mouth Toes) (Hat Shoe Socks)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Third Sort

Perceptual Sort

RULE

Triangles Above Word Triangles Below Word
(Ears Mouth Socks) (Hat Shoe Toes)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Fourth Sort

Perceptual Sort

RULE

Cursive Letters Printed Letters
(Ears Hat Toes) (Mouth Shoe Socks)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Fifth Sort

Verbal Sort

RULE

Plural Words Singular Words
(Ears Socks Toes) (Mouth Shoe Hat)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Sort Recognition: Card Set 2 (continued)

Sixth Sort

Perceptual Sort

RULE

Diagonals Slope Up
(Ears Hat Shoe)

Diagonals Slope Down
(Mouth Socks Toes)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Seventh Sort

Verbal Sort

RULE

Related to Head
(Ears Hat Mouth)

Related to Feet
(Shoe Socks Toes)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Eighth Sort

Perceptual Sort

RULE

Filled Triangles
(Ears Mouth Shoe)

Empty Triangles
(Hat Socks Toes)

Description:

PRIMARY DESCRIPTION MEASURES

1st Group Description Score	0	1	2
2nd Group Description Score	0	1	2

OPTIONAL DESCRIPTION MEASURES

Incorrect Description	Y
Repeated Description	Y
No/Don't Know Response	Y
Noncredit Description	Y
Overly Abstract Description	Y
Description Type	V P

Sort Recognition: Card Set 2

Raw Score

Total Description Score

D-KEFS Sorting Test: Summary of Scores

Primary Measures

	Card Set 1	+	Card Set 2	=	Raw Score	Scaled Score
--	------------	---	------------	---	-----------	--------------

Condition 1: Free Sorting

Confirmed Correct Sorts

<u> </u>	+	<u> </u>	=	<input type="text"/>	→	<input type="text"/>
Raw Score		Raw Score				

Free Sorting Description Score

<u> </u>	+	<u> </u>	=	<input type="text"/>	→	<input type="text"/>
Raw Score		Raw Score				

Condition 2: Sort Recognition

Sort Recognition Description Score

<u> </u>	+	<u> </u>	=	<input type="text"/>	→	<input type="text"/>
Raw Score		Raw Score				

Combined Conditions 1 + 2

	Condition 1: Free Sorting		Condition 2: Sort Recognition		Sum of Scaled Scores	Composite Scaled Score
	Description Score		Description Score			
Combined Description Score	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	→ <input type="text"/>
	Scaled Score		Scaled Score			

Contrast Measure: Sort Recognition Versus Free Sorting Description Score

Condition 2: Sort Recognition		Condition 1: Free Sorting		Scaled-Score Difference	Contrast Scaled Score*
Description Score		Description Score			
<input type="text"/>	-	<input type="text"/>	=	<input type="text"/>	→ <input type="text"/>
Scaled Score		Scaled Score			

* A low or high contrast scaled score may reflect different cognitive problems; see examiner's manual.

Optional Measures

Screening Pretest

	Raw Score	→	Cumulative Percentile Rank
Word Reading Errors	<input type="text"/>	→	<input type="text"/>
Word Comprehension Errors	<input type="text"/>	→	<input type="text"/>

Optional Measures (continued)

Condition 1: Free Sorting Sorting Measures (Optional)

Confirmed Correct Sorts: Card Set 1	Raw Score	[]	→	[]	Scaled Score
Confirmed Correct Sorts: Card Set 2	Raw Score	[]	→	[]	Scaled Score
	Card Set 1	+	Card Set 2	=	Total Raw Score
Confirmed Correct Verbal Sorts	[]	+	[]	=	[] → []
	Raw Score		Raw Score		
Confirmed Correct Perceptual Sorts	[]	+	[]	=	[] → []
	Raw Score		Raw Score		
Confirmed/Unconfirmed Target Sorts	[]	+	[]	=	[] → []
	Raw Score		Raw Score		
Repeated Sorts	[]	+	[]	=	[] → []
	Raw Score		Raw Score		
Set-Loss Sorts	[]	+	[]	=	[] → [] Cumulative Percentile Rank
	Raw Score		Raw Score		
Nontarget Even Sorts	[]	+	[]	=	[] → [] Cumulative Percentile Rank
	Raw Score		Raw Score		
Attempted Sorts	[]	+	[]	=	[] → []
	Raw Score		Raw Score		
Percent Sorting Accuracy	$\left[\frac{\text{Confirmed Correct Sorts}}{\text{Total Raw Score}} \div \frac{\text{Attempted Sorts}}{\text{Total Raw Score}} \right] \times 100 =$			[] → []	
Time-Per-Sort Ratio**	$\frac{\text{Cumulative Sorting Time Cards Sets 1 + 2}}{\text{Total Raw Score}} \div \frac{\text{Attempted Sorts}}{\text{Total Raw Score}} =$			[] → []	

Condition 1: Free Sorting Description Measures (Optional)

Free Sorting Description Score: Card Set 1	Raw Score	[]	→	[]	Scaled Score
Free Sorting Description Score: Card Set 2	Raw Score	[]	→	[]	Scaled Score
	Card Set 1	+	Card Set 2	=	Total Raw Score
Free Sorting Incorrect Descriptions*	[]	+	[]	=	[] → []
	Raw Score		Raw Score		
Free Sorting Repeated Descriptions*	[]	+	[]	=	[] → [] Cumulative Percentile Rank
	Raw Score		Raw Score		
Percent Description Accuracy	$\left[\frac{\text{Free Sorting Description Score}}{\text{Total Raw Score}} \div \left[\frac{\text{Attempted Sorts}}{\text{Total Raw Score}} \times 4 \right] \right] \times 100 =$			[] → []	

Optional Measures (continued)

Condition 2: Sort Recognition Description Measures (Optional)

	Raw Score		Scaled Score
Sort Recognition Description Score: Card Set 1	<input style="width: 50px; height: 25px;" type="text"/>	→	<input style="width: 50px; height: 25px;" type="text"/>
Sort Recognition Description Score: Card Set 2	<input style="width: 50px; height: 25px;" type="text"/>	→	<input style="width: 50px; height: 25px;" type="text"/>
	Card Set 1	+	Card Set 2 = Total Raw Score
Sort Recognition Incorrect Descriptions*	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	+	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small> = <input style="width: 50px; height: 25px;" type="text"/> → <input style="width: 50px; height: 25px;" type="text"/>
Sort Recognition Repeated Descriptions*	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	+	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small> = <input style="width: 50px; height: 25px;" type="text"/> → <input style="width: 50px; height: 25px;" type="text"/> <small>Cumulative Percentile Rank</small>

Combined Conditions 1 + 2: Description Measures (Optional)

	Condition 1: Free Sorting Total	+	Condition 2: Sort Recognition Total	=	Combined Raw Score	→	Scaled Score
Combined Description Score: Verbal Rules	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	+	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	=	<input style="width: 50px; height: 25px;" type="text"/>	→	<input style="width: 50px; height: 25px;" type="text"/>
Combined Description Score: Perceptual Rules	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	+	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	=	<input style="width: 50px; height: 25px;" type="text"/>	→	<input style="width: 50px; height: 25px;" type="text"/>
Combined No/Don't Know Responses	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	+	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	=	<input style="width: 50px; height: 25px;" type="text"/>	→	<input style="width: 50px; height: 25px;" type="text"/>
Combined Noncredit Descriptions	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	+	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	=	<input style="width: 50px; height: 25px;" type="text"/>	→	<input style="width: 50px; height: 25px;" type="text"/> <small>Cumulative Percentile Rank</small>
Combined Overly Abstract Descriptions	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	+	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	=	<input style="width: 50px; height: 25px;" type="text"/>	→	<input style="width: 50px; height: 25px;" type="text"/> <small>Cumulative Percentile Rank</small>
	Condition 1: Free Sorting	+	Condition 2: Sort Recognition	=	Sum of		Composite
	Incorrect Descriptions	+	Incorrect Descriptions	=	Scaled Scores		Scaled Score
Combined Incorrect Descriptions*	<input style="width: 50px; height: 25px;" type="text"/> <small>Scaled Score</small>	+	<input style="width: 50px; height: 25px;" type="text"/> <small>Scaled Score</small>	=	<input style="width: 50px; height: 25px;" type="text"/>	→	<input style="width: 50px; height: 25px;" type="text"/>
	Repeated Descriptions	+	Repeated Descriptions	=	Total		Raw Score
Combined Repeated Descriptions*	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	+	<input style="width: 50px; height: 25px;" type="text"/> <small>Raw Score</small>	=	<input style="width: 50px; height: 25px;" type="text"/>	→	<input style="width: 50px; height: 25px;" type="text"/> <small>Cumulative Percentile Rank</small>

* No/Don't Know responses are not included in these measures

Note: Cumulative percentile ranks for the D-KEFS were scaled to reflect the percentage of the normative sample that obtained raw scores equal to or worse than the raw score obtained by the examinee.

D-KEFS Twenty Questions Test

Ages 8–89

Materials

Record Form

Stimulus Booklet (Flat Position)

Discontinue

Do not discontinue. Administer all four items to examinees in the order in which they appear here. Discontinue each item after the examinee either has identified the target object or has asked 20 yes/no questions without identifying the target object. Do not reveal the target object if the examinee has failed to identify it after asking 20 questions.

Administration and Recording

Position the stimulus booklet flat on the table in a horizontal (landscape) position directly in front of the examinee's midline, with the pictures facing the examinee.

Say,

Now we are going to do something where you ask *me* questions. I have picked *one* of these pictures, and I want you to figure out which one it is by asking me questions. You can only ask questions that I can answer yes or no. You can ask any question at all, as long as I can answer it yes or no. Try to guess the picture that I have picked with the fewest number of questions you can. I'm going to write down your questions so I can remember them. Go ahead and ask me the fewest number of yes/no questions you can to figure out which picture I have selected.

Record verbatim each of the examinee's questions in the order that they are asked. Answer **Yes** if the examinee's question encompasses or identifies the target item or **No** if it does not. Circle *Y* (for yes) or *N* (for no) to indicate your answer to each of the examinee's questions.

Whether or not the examinee correctly identifies the target object for Item 1 after asking 20 yes/no questions or fewer, say,

Good. Let's try the next one. I've picked a new picture, and I want you to ask me the fewest number of yes/no questions you can to figure out which one it is. Go ahead.

Repeat these administration and recording procedures for each of Items 2–4.

COMMON PROMPTS

- ◆ If an examinee's first question for an item refers only to one object (e.g., "Is it the elephant?"), record and answer the question. Then say, **Remember, try to ask the fewest number of questions you can.** Provide this prompt only once for each item.
- ◆ When answering questions, respond only with yes or no as much as possible. In deciding how to answer, base your response on how most people would respond to the same question. If the question could possibly be answered either way, you may say, **Most people would say yes** or **Most people would say no**. If an answer is true or untrue for an item most of the time, you may say, **Usually yes** or **Usually no**.
- ◆ If you do not know the answer to an examinee's question, say, **That's an excellent question. I'm not sure I know the answer. Try another question.** Do not count this question as one of the 20 questions.
- ◆ If an examinee asks a compound question (e.g., "Is it red and a plant?"), record the response and say, **I can answer only one of those questions. Which one do you want me to answer?** If the examinee asks an either/or question (e.g., "Is it an animal or a fruit?"), ask him or her to rephrase it as a yes/no question. After these prompts, if the examinee provides a yes/no question that clarifies the compound or either/or question, consider both responses as representing one yes/no question.
- ◆ If you are unsure of how to answer a spatial question, say, **Show me the ones you mean.** Pointing to the target object is an acceptable correct response.
- ◆ Some common types of questions ("Is it living?" or "Is it dead?") can be difficult to answer yes or no for some target items. If the object is organic or natural, say, **Yes, it is or once was living.** If the object is inorganic or human-made, say, **No, it never was alive.**
- ◆ If the examinee's question is vague (e.g., "Is it big?"), say, **Could you make your question more specific?** Consider both the vague question and any additional specific question as representing only one question.
- ◆ If an examinee fails to identify the target object after 20 questions but wants to know which one it is, say, **I can't tell you, but try to guess the next one.**

SPECIAL CONSIDERATIONS

- ◆ If an examinee has difficulty perceiving an object on the stimulus page because of visual problems and asks for clarification (e.g., "Is that a fork?"), record and answer the question; however, do not score or count it as one of the 20 questions allowed for that item.
- ◆ An examinee may have difficulty remembering previously asked questions, your yes/no answers to those questions, or both, and request that the information be repeated. You may provide such information as often as it is requested.
- ◆ If an examinee points to the correct target object but misnames it, the response is still considered correct.

D-KEFS Twenty Questions Test

Discontinue each item after the examinee asks 20 questions without identifying the target object.

Total Questions Asked (Circle One)	Item 1 (banana)	Examiner's Answer	Weighted Achievement Score (Circle One)	Total Questions Asked (Circle One)	Item 2 (spoon)	Examiner's Answer	Weighted Achievement Score (Circle One)
1		Y N	1	1		Y N	1
2		Y N	1	2		Y N	1
3		Y N	2	3		Y N	2
4		Y N	5	4		Y N	5
5		Y N	5	5		Y N	5
6		Y N	4	6		Y N	4
7		Y N	4	7		Y N	4
8		Y N	3	8		Y N	3
9		Y N	3	9		Y N	3
10		Y N	3	10		Y N	3
11		Y N	2	11		Y N	2
12		Y N	2	12		Y N	2
13		Y N	2	13		Y N	2
14		Y N	2	14		Y N	2
15		Y N	1	15		Y N	1
16		Y N	1	16		Y N	1
17		Y N	1	17		Y N	1
18		Y N	1	18		Y N	1
19		Y N	1	19		Y N	1
20		Y N	1	20		Y N	1
21	← Failed to guess in 20 questions →		0	21	← Failed to guess in 20 questions →		0

Item 1:
Total Questions Asked
Max. = 21

Raw Score

Initial Abstraction Score* _____

Optional Scores:

Spatial Questions _____

Repeated Questions _____

Set-Loss Questions _____

Item 1:
Weighted Achievement Score
Max. = 5

Raw Score

Initial Abstraction Score* _____

Optional Scores:

Spatial Questions _____

Repeated Questions _____

Set-Loss Questions _____

Item 2:
Total Questions Asked
Max. = 21

Raw Score

Initial Abstraction Score* _____

Optional Scores:

Spatial Questions _____

Repeated Questions _____

Set-Loss Questions _____

Item 2:
Weighted Achievement Score
Max. = 5

Raw Score

Initial Abstraction Score* _____

Optional Scores:

Spatial Questions _____

Repeated Questions _____

Set-Loss Questions _____

* Minimum number of objects eliminated by the first question asked regardless of the yes or no answer.

D-KEFS Twenty Questions Test (continued)

Discontinue each item after the examinee asks 20 questions without identifying the target object.

Total Questions Asked (Circle One)	Item 3 (owl)	Examiner's Answer	Weighted Achievement Score (Circle One)	Total Questions Asked (Circle One)	Item 4 (helicopter)	Examiner's Answer	Weighted Achievement Score (Circle One)
1		Y N	1	1		Y N	1
2		Y N	1	2		Y N	1
3		Y N	2	3		Y N	2
4		Y N	5	4		Y N	5
5		Y N	5	5		Y N	5
6		Y N	4	6		Y N	4
7		Y N	4	7		Y N	4
8		Y N	3	8		Y N	3
9		Y N	3	9		Y N	3
10		Y N	3	10		Y N	3
11		Y N	2	11		Y N	2
12		Y N	2	12		Y N	2
13		Y N	2	13		Y N	2
14		Y N	2	14		Y N	2
15		Y N	1	15		Y N	1
16		Y N	1	16		Y N	1
17		Y N	1	17		Y N	1
18		Y N	1	18		Y N	1
19		Y N	1	19		Y N	1
20		Y N	1	20		Y N	1
21	← Failed to guess in 20 questions →		0	21	← Failed to guess in 20 questions →		0

Item 3:
Total Questions Asked
Max. = 21

Raw Score	
Initial Abstraction Score*	_____
Optional Scores:	
# Spatial Questions	_____
# Repeated Questions	_____
# Set-Loss Questions	_____

Item 3:
Weighted Achievement Score
Max. = 5

Item 4:
Total Questions Asked
Max. = 21

Raw Score	
Initial Abstraction Score*	_____
Optional Scores:	
# Spatial Questions	_____
# Repeated Questions	_____
# Set-Loss Questions	_____

Item 4:
Weighted Achievement Score
Max. = 5

* Minimum number of objects eliminated by the first question asked regardless of the yes or no answer.

D-KEFS Twenty Questions Test: Summary of Scores

Primary Measures

	Item 1 Raw Score		Item 2 Raw Score		Item 3 Raw Score		Item 4 Raw Score		Total Raw Score		Scaled Score
Initial Abstraction Score*	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>

* Minimum number of objects eliminated by the first question asked regardless of the yes or no answer.

Total Questions Asked	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>
-----------------------	----------------------	---	----------------------	---	----------------------	---	----------------------	---	----------------------	---	----------------------

Total Weighted Achievement Score	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>
----------------------------------	----------------------	---	----------------------	---	----------------------	---	----------------------	---	----------------------	---	----------------------

Optional Measures

	Item 1 Raw Score		Item 2 Raw Score		Item 3 Raw Score		Item 4 Raw Score		Total Raw Score		Cumulative Percentile Rank
Spatial Questions	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>

Repeated Questions	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>
--------------------	----------------------	---	----------------------	---	----------------------	---	----------------------	---	----------------------	---	----------------------

Set-Loss Questions	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>	→	<input type="text"/>
--------------------	----------------------	---	----------------------	---	----------------------	---	----------------------	---	----------------------	---	----------------------

Note: Cumulative percentile ranks for the D-KEFS were scaled to reflect the percentage of the normative sample that obtained raw scores equal to or worse than the raw score obtained by the examinee.

D-KEFS Word Context Test

Do not discontinue. Administer all items in the order presented here and in the stimulus booklet.

Practice Item: sev (apple)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

1. prifa (eat)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

Incorrect responses on all sentences:

Incorrect response on Sentence 5:

2. enton (dance)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

Incorrect responses on all sentences:

Incorrect response on Sentence 5:

D-KEFS Word Context Test (continued)

3. delz (voice)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

Incorrect responses on all sentences:

Incorrect response on Sentence 5:

4. vern (horse)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

Incorrect responses on all sentences:

Incorrect response on Sentence 5:

5. nelzen (make)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

Incorrect responses on all sentences:

Incorrect response on Sentence 5:

D-KEFS Word Context Test (continued)

6. gesh (fill)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

Incorrect responses on all sentences:

Incorrect response on Sentence 5:

7. luri (motor, engine)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

Incorrect responses on all sentences:

Incorrect response on Sentence 5:

8. krame (tooth, teeth)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

Incorrect responses on all sentences:

Incorrect response on Sentence 5:

9. kapla (word)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

Incorrect responses on all sentences:

Incorrect response on Sentence 5:

10. grot (curtain)

Examinee's Responses:

1. _____
2. _____
3. _____
4. _____
5. _____

Response Correct	1st Sentence Correct (Circle One)	1st Sentence Consecutively Correct (Circle One)	Optional: # Repeated Incorrect
Y N	5	5	<input type="text"/>
Y N	4	4	Raw Score
Y N	3	3	# No/DK Responses
Y N	2	2	<input type="text"/>
Y N	1	1	Raw Score
			# Correct-To-Incorrect
			<input type="text"/>
			Raw Score

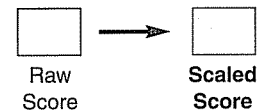
Incorrect responses on all sentences:

Incorrect response on Sentence 5:

D-KEFS Word Context Test: Summary of Scores

Primary Measure

Total Consecutively Correct

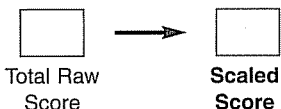


Optional Measures

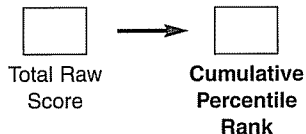
Consistently Correct Ratio

$$\left[\frac{\text{Total Consecutively Correct Score}}{\text{Raw Score}} \div \frac{\text{Total First Sentence Correct Score}}{\text{Raw Score}} \right] \times 100 = \text{Percent Raw Score} \rightarrow \text{Scaled Score}$$

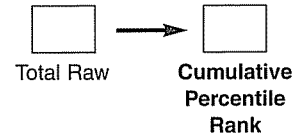
Repeated Incorrect Responses



No/Don't Know Responses



Total Correct-To-Incorrect Errors



Note: Cumulative percentile ranks for the D-KEFS were scaled to reflect the percentage of the normative sample that obtained raw scores equal to or worse than the raw score obtained by the examinee.

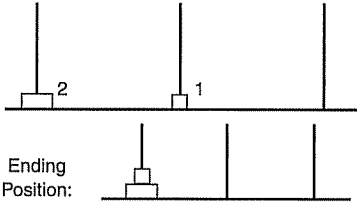
D-KEFS Tower Test

Discontinue after three consecutive item failures. Disk Labels: 1 = Smallest to 5 = Largest.

Item 1: Two Disks

Time Limit: 30"

**Starting Position
(Examiner's View)**



1st Move Time	Total # Moves (Min. = 1)	# Rule Violations	Item Completion Time
			Correct Tower Y N

Demonstrate 1-move solution if examinee fails to solve item in 1 move.

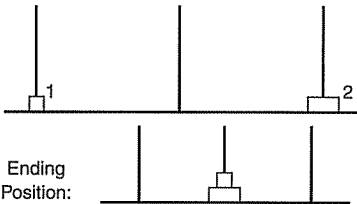
Achievement Score

Correct Within Time Limit			
Failed	>1 Moves	1 Move	
0	1	2	

Item 2: Two Disks

Time Limit: 30"

**Starting Position
(Examiner's View)**



1st Move Time	Total # Moves (Min. = 2)	# Rule Violations	Item Completion Time
			Correct Tower Y N

Demonstrate 2-move solution if examinee fails to solve item in 2 moves.

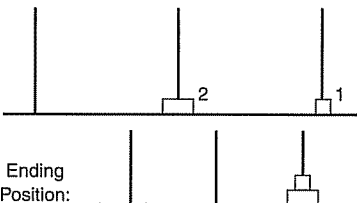
Achievement Score

Correct Within Time Limit			
Failed	>2 Moves	2 Moves	
0	1	2	

Item 3: Two Disks

Time Limit: 30"

**Starting Position
(Examiner's View)**



1st Move Time	Total # Moves (Min. = 3)	# Rule Violations	Item Completion Time
			Correct Tower Y N

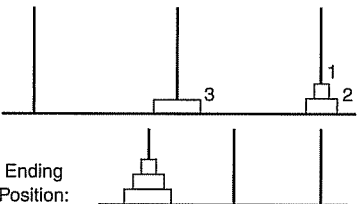
Achievement Score

Correct Within Time Limit			
Failed	>4 Moves	4 Moves	3 Moves
0	1	2	3

Item 4: Three Disks

Time Limit: 60"

**Starting Position
(Examiner's View)**



1st Move Time	Total # Moves (Min. = 4)	# Rule Violations	Item Completion Time
			Correct Tower Y N

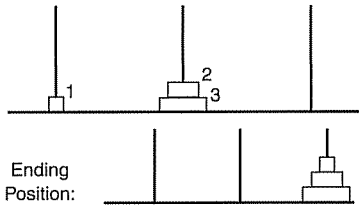
Achievement Score

Correct Within Time Limit			
Failed	>5 Moves	5 Moves	4 Moves
0	1	2	3

Item 5: Three Disks

Time Limit: 120"

**Starting Position
(Examiner's View)**



1st Move Time	Total # Moves (Min. = 7)	# Rule Violations	Item Completion Time
			Correct Tower Y N

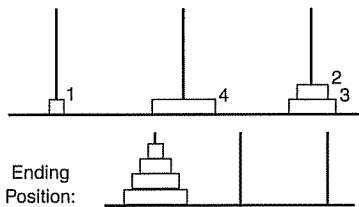
Achievement Score

Correct Within Time Limit				
	>9	9	8	7
Failed	Moves	Moves	Moves	Moves
0	1	2	3	4

Item 6: Four Disks

Time Limit: 120"

**Starting Position
(Examiner's View)**



1st Move Time	Total # Moves (Min. = 9)	# Rule Violations	Item Completion Time
			Correct Tower Y N

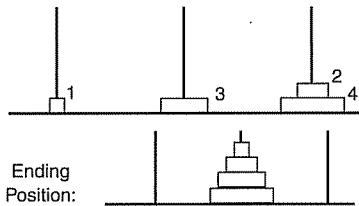
Achievement Score

Correct Within Time Limit				
	>11	11	10	9
Failed	Moves	Moves	Moves	Moves
0	1	2	3	4

Item 7: Four Disks

Time Limit: 180"

**Starting Position
(Examiner's View)**



1st Move Time	Total # Moves (Min. = 13)	# Rule Violations	Item Completion Time
			Correct Tower Y N

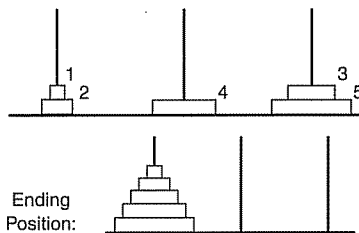
Achievement Score

Correct Within Time Limit				
	>15	15	14	13
Failed	Moves	Moves	Moves	Moves
0	1	2	3	4

Item 8: Five Disks

Time Limit: 240"

**Starting Position
(Examiner's View)**



1st Move Time	Total # Moves (Min. = 20)	# Rule Violations	Item Completion Time
			Correct Tower Y N

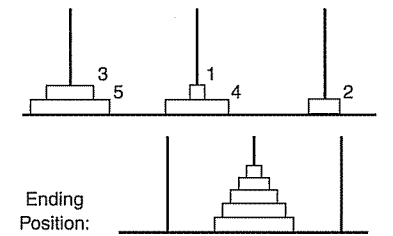
Achievement Score

Correct Within Time Limit				
	>24	23-24	21-22	20
Failed	Moves	Moves	Moves	Moves
0	1	2	3	4

Item 9: Five Disks

Time Limit: 240"

**Starting Position
(Examiner's View)**



1st Move Time	Total # Moves (Min. = 26)	# Rule Violations	Item Completion Time
			Correct Tower Y N

Achievement Score

**Correct Within
Time Limit**

	>32	30-32	27-29	26
Failed	Moves	Moves	Moves	Moves
0	1	2	3	4

D-KEFS Tower Test: Summary of Scores

Totals for Items Administered

□

Total
Achievement Score

Primary Measure

Scaled Score

Optional Measures

Scaled Score

11

11

Scaled
Score

==

**Scaled
Score**

==

→

1

Cumulative
Percentile RankScaled
Score

=====

Total Cumulative Minimum Moves Possible

Number of Items Administered	Cumulative Minimum Moves Possible
1	1
2	3
3	6
4	10
5	17
6	26
7	39
8	59
9	85

Circle the cumulative minimum number of moves possible for the number of items administered to determine the total number of minimum moves.

* A low or high ratio scaled score on these measures may reflect different cognitive problems; see examiner's manual.

D-KEFS Proverb Test

Do not discontinue.

Condition 1:
Free Inquiry
Circle Score

Condition 2:
Multiple Choice
Circle Letter Choice/Score

	Accuracy Score	Abstraction Score	Total Achievement Score (Score 0 if Accuracy = 0)	0 Points		2 Points	4 Points
				Phon	Unrel	Concrete	Abstract
1. You can't judge a book by its cover.	0 1 2	0 2		b 0	a	d 2	c 4
2. Don't count your chickens before they are hatched.	0 1 2	0 2		c 0	b	d 2	a 4
3. Rome wasn't built in a day.	0 1 2	0 2		a 0	d	c 2	b 4
4. Too many cooks spoil the soup.	0 1 2	0 2		d 0	a	b 2	c 4
5. People who live in glass houses shouldn't throw stones.	0 1 2	0 2		a 0	c	b 2	d 4
6. An old ox plows a straight row.	0 1 2	0 2		d 0	c	a 2	b 4
7. A small leak will sink a large ship.	0 1 2	0 2		b 0	d	a 2	c 4
8. No bread is without a crust.	0 1 2	0 2		d 0	c	a 2	b 4

Common Proverbs (Items 1-5)

Uncommon Proverbs (Items 6-8)

Total Accuracy Score

Total Abstraction Score

Total Achievement Score

Free Inquiry

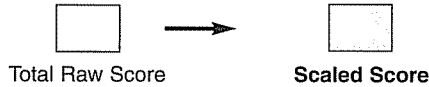
Total Achievement Score

Multiple Choice

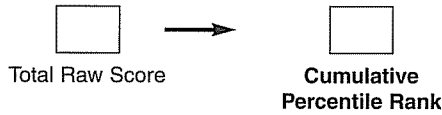
D-KEFS Proverb Test: Summary of Scores

Primary Measures

Total Achievement Score: Free Inquiry



Total Achievement Score: Multiple Choice

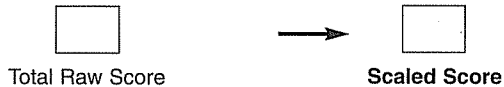


Optional Measures: Free Inquiry

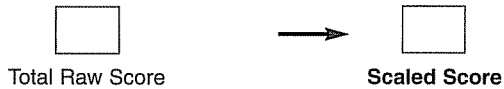
Common Proverb Achievement Score:
Free Inquiry Items 1–5



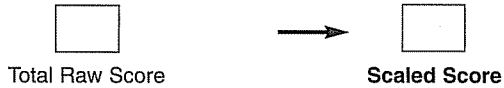
Uncommon Proverb Achievement Score:
Free Inquiry Items 6–8



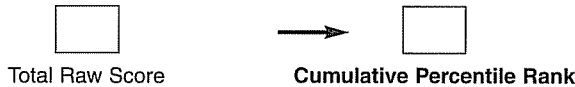
Accuracy Only Score



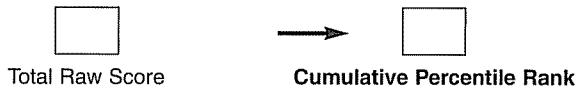
Abstraction Only Score



No/Don't Know Responses

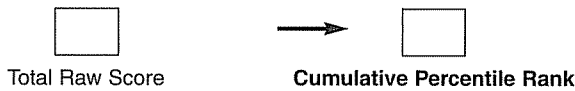


Repeated Responses

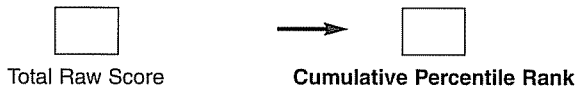


Optional Measures: Multiple Choice

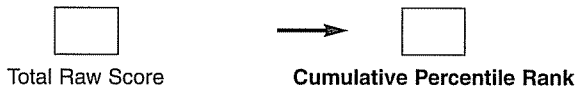
Common Proverb Achievement Score:
Multiple Choice Items 1–5



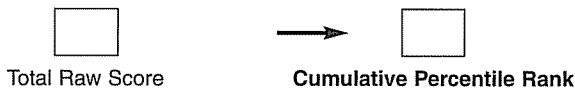
Uncommon Proverb Achievement Score:
Multiple Choice Items 6–8



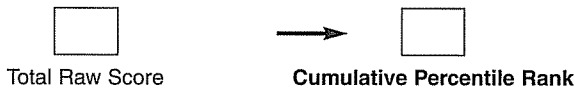
Total Correct Abstract Choices



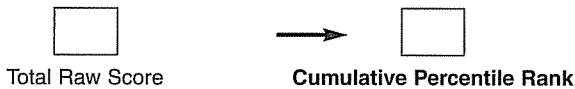
Total Correct Concrete Choices



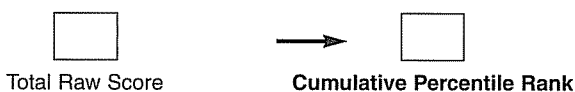
Total Incorrect Phonemic Choices



Total Incorrect Unrelated Choices



Total Incorrect Phonemic +
Unrelated Choices



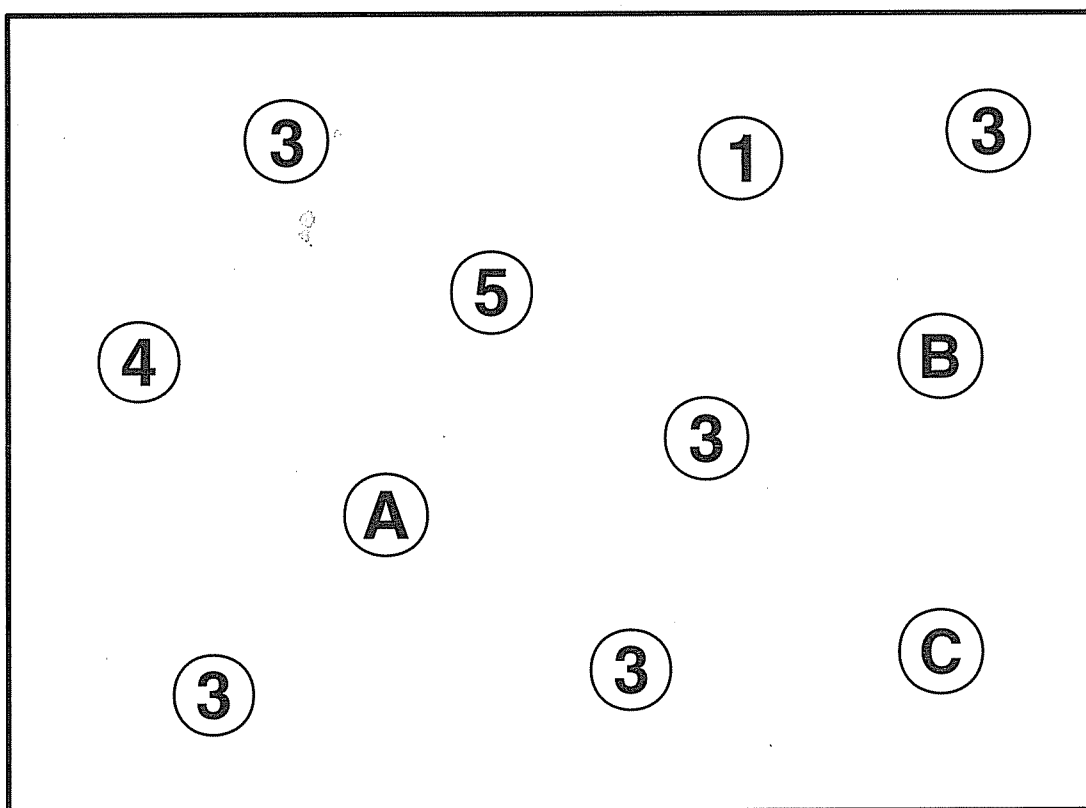
Note: Cumulative percentile ranks for the D-KEFS were scaled to reflect the percentage of the normative sample that obtained raw scores equal to or worse than the raw score obtained by the examinee.

Name _____ Age _____
 ID _____ Date _____
 Examiner _____
 Notes _____

Trail Making Test

Condition 1 Visual Scanning

Practice



29 30 A B C D E

3

8

N

3

C

3

G

3

4

3

3

6

F

5

3

14

12

3

H

3

B

P

3

3

E

3

7

3

I

2

K

3

10

3

3

A

9

D

3

11

3

3

J

M

3

3

16

O

1

3

3

15

3

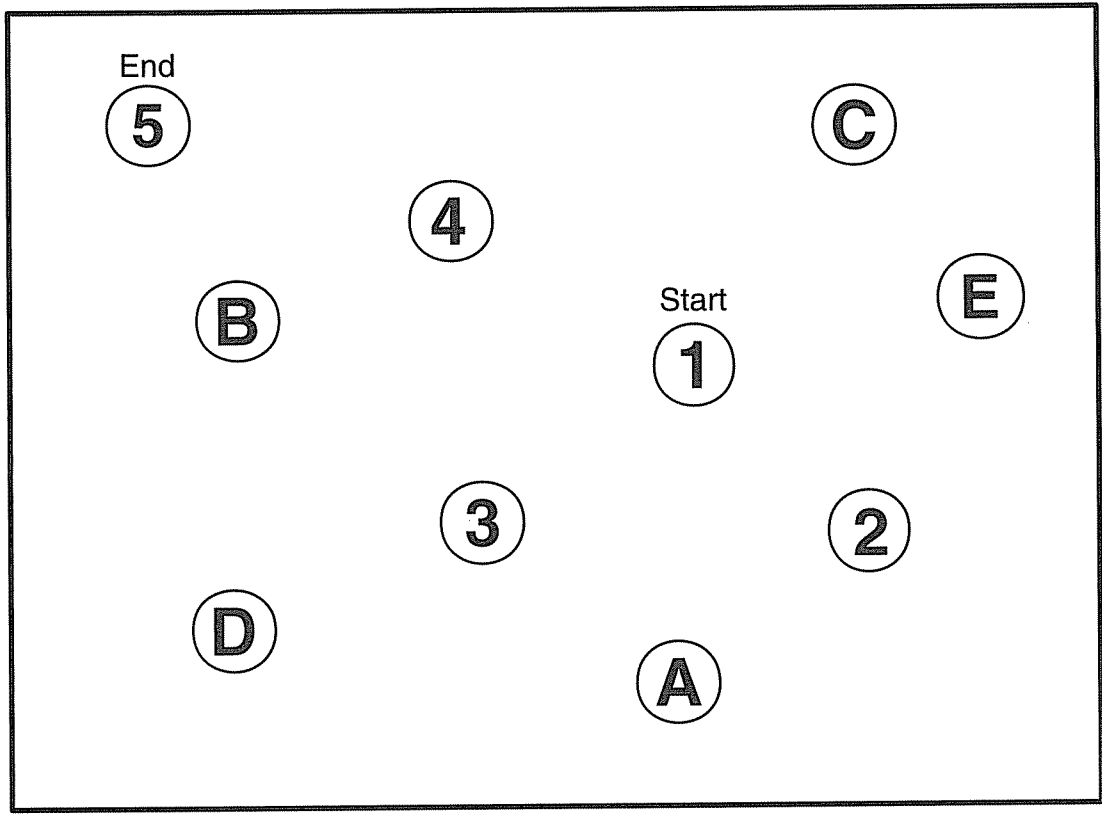
L

Name _____ Age _____
 ID _____ Date _____
 Examiner _____
 Notes _____

Trail Making Test

Condition 2 Number Sequencing

Practice



29 30 ABCDE

H

9

I

11

A

K

10

1
Start

J

End
16

L

O

M

12

15

13

F

7

8

B

G

C

2

3

P

4

D

E

N

6

5

14

Name _____ Age _____

ID _____ Date _____

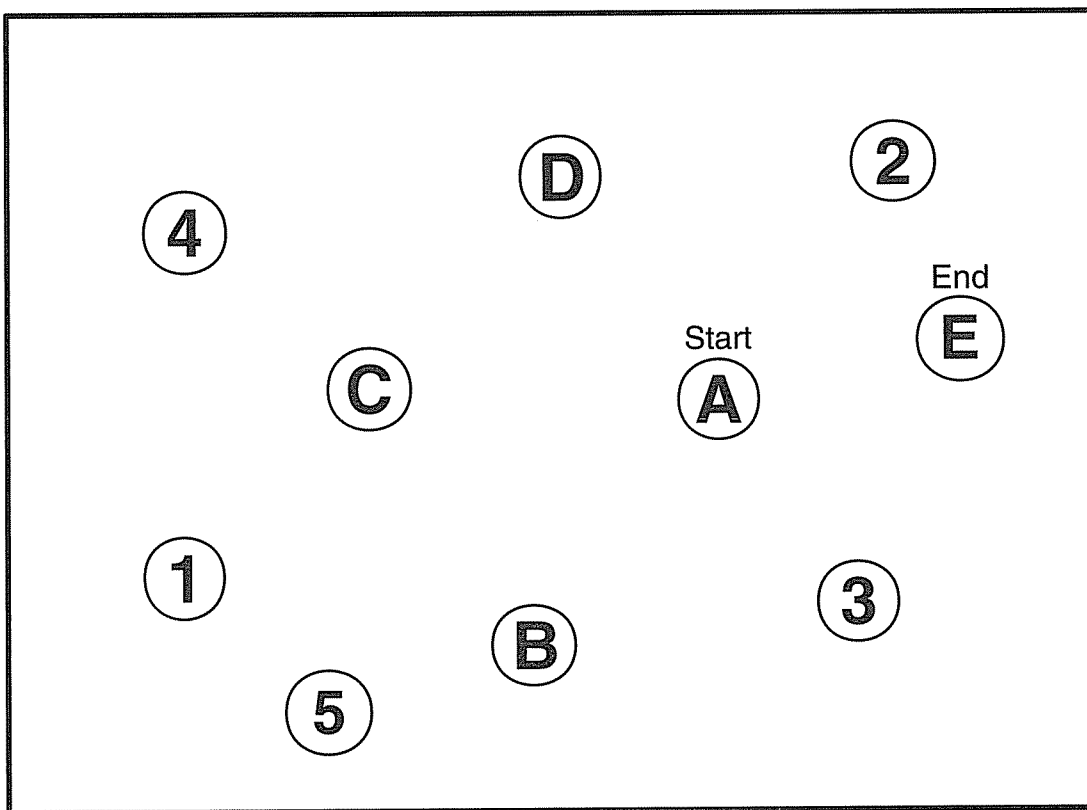
Examiner _____

Notes _____

Trail Making Test

Condition 3 Letter Sequencing

Practice



29 30 A B C D E

G

F

8

7

2

B

C

3

6

End

P

5

4

D

E

14

N

H

K

9

10

12

I

11

A
Start

J

1

13

16

15

O

L

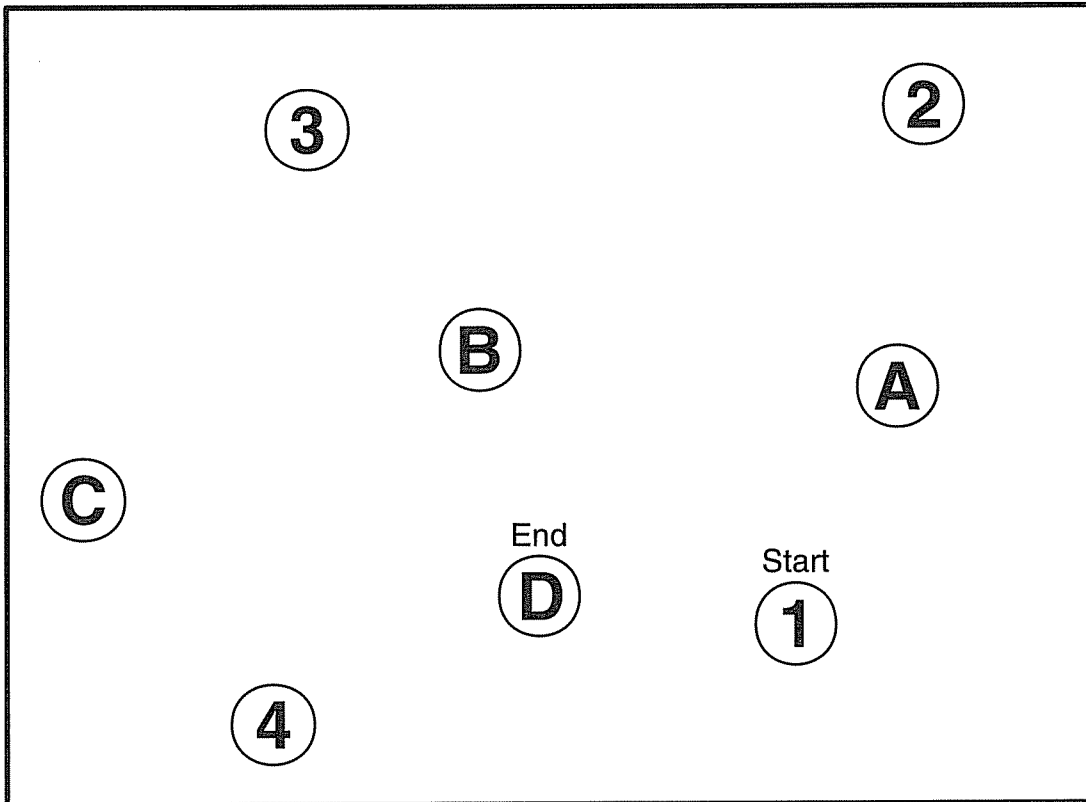
M

Name _____ Age _____
 ID _____ Date _____
 Examiner _____
 Notes _____

Trail Making Test

Condition 4 Number-Letter Switching

Practice



29 30 A B C D E

14

15

O

16

M

L

Start

1

K

P

End

A

13

12

11

J

I

10

N

E

5

D

6

4

3

C

7

B

F

G

2

9

8

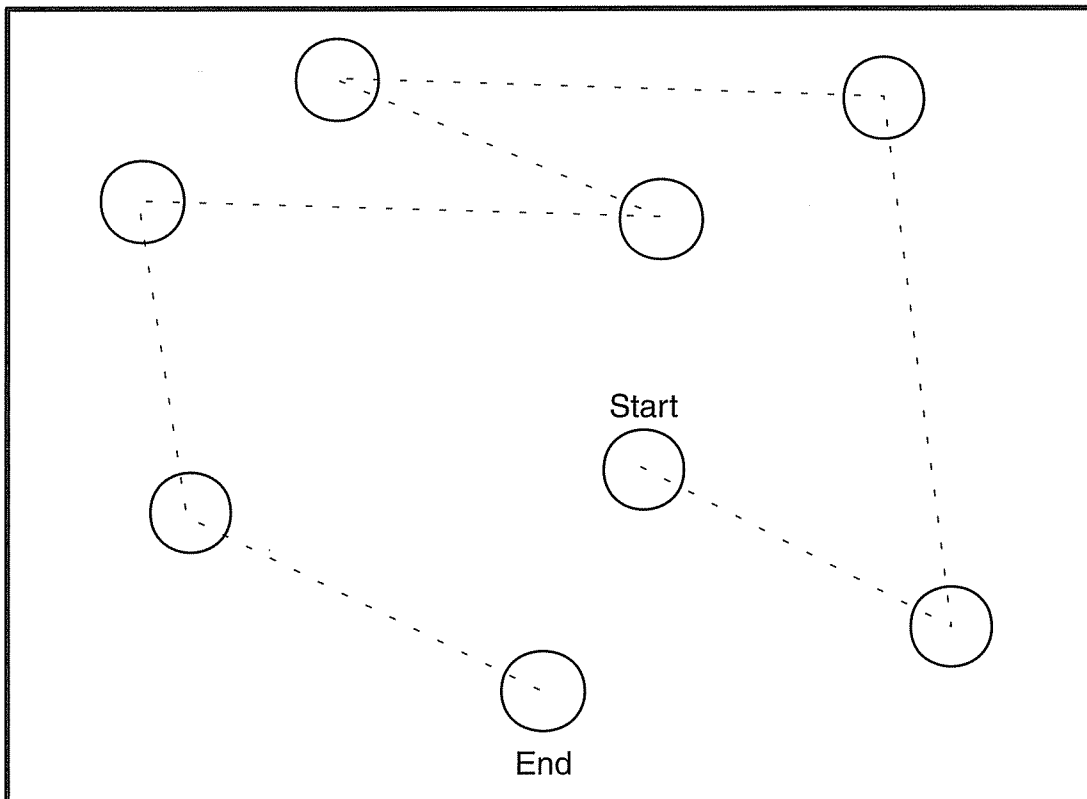
H

Name _____ Age _____
 ID _____ Date _____
 Examiner _____
 Notes _____

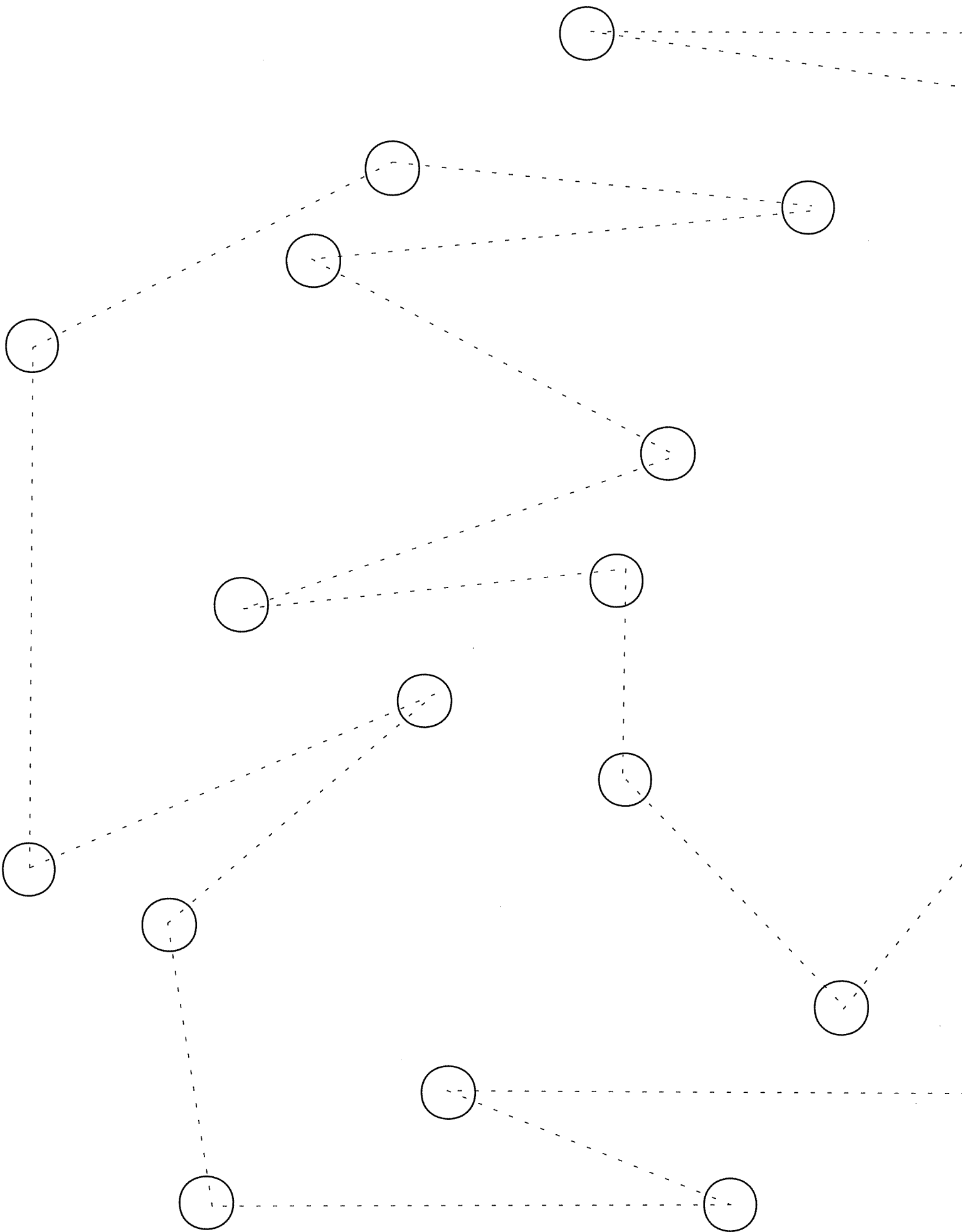
Trail Making Test

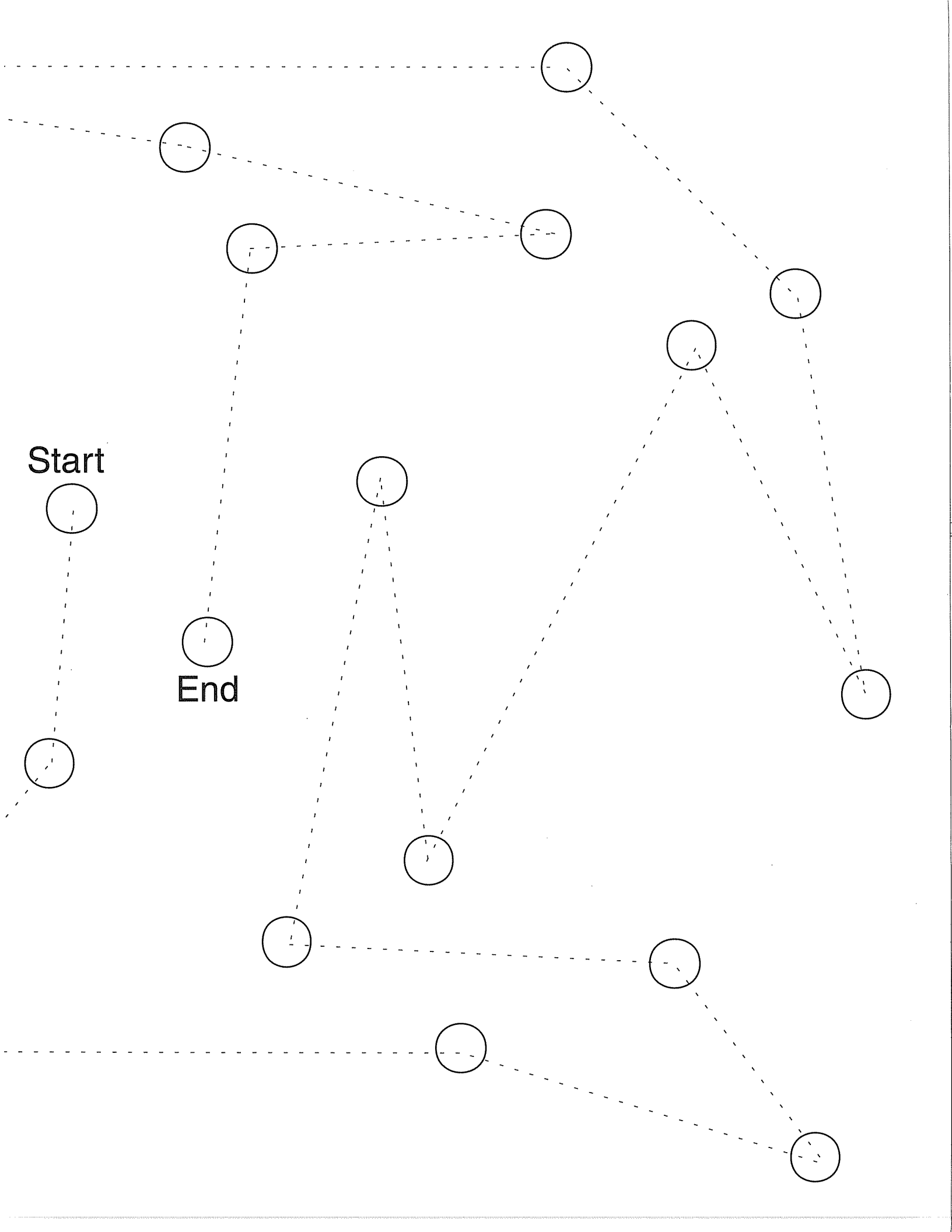
Condition 5
Motor Speed

Practice



28 29 30 A B C D E



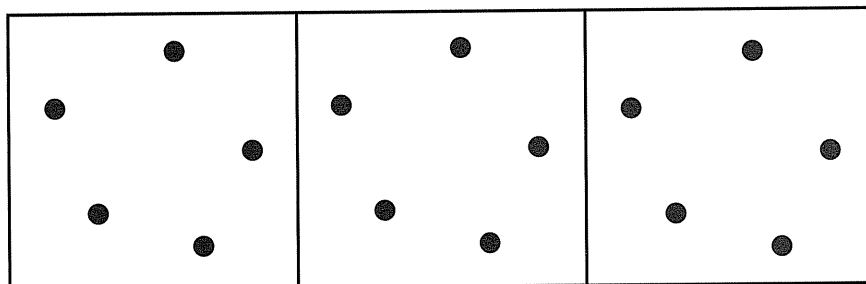


Design Fluency Test

Name _____ Age _____
 ID _____ Date _____
 Examiner _____
 Notes _____

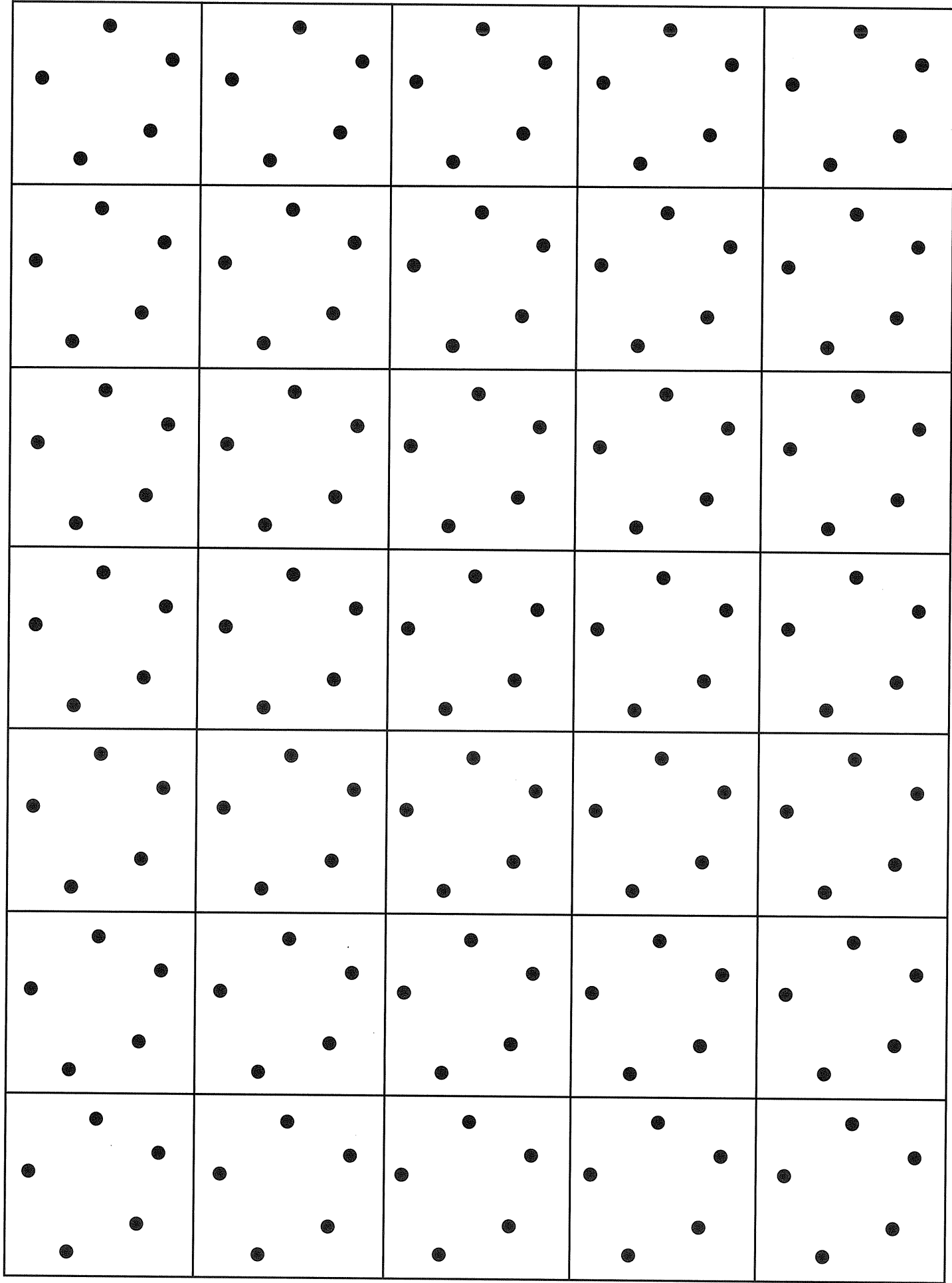
Condition 1
 Filled Dots

Practice

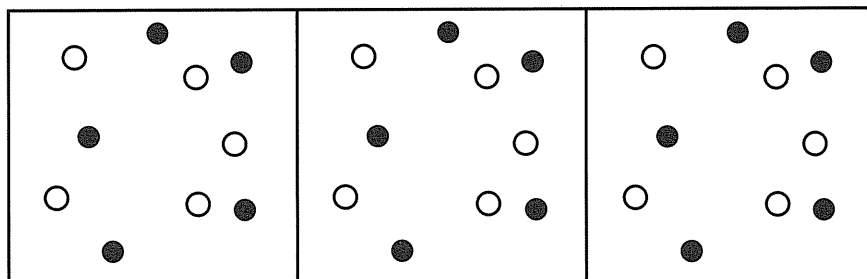


Filled Dots

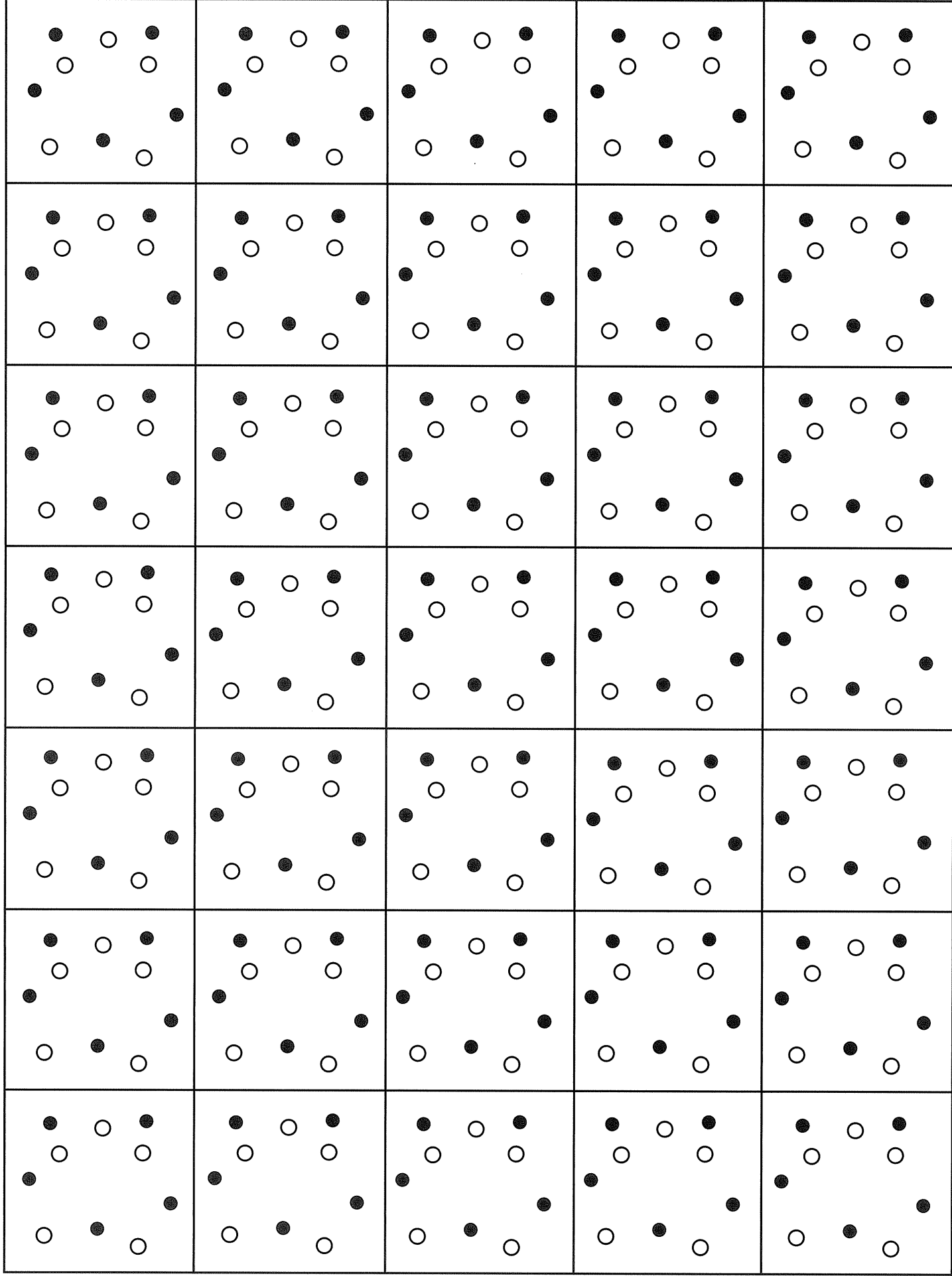
Top



Practice

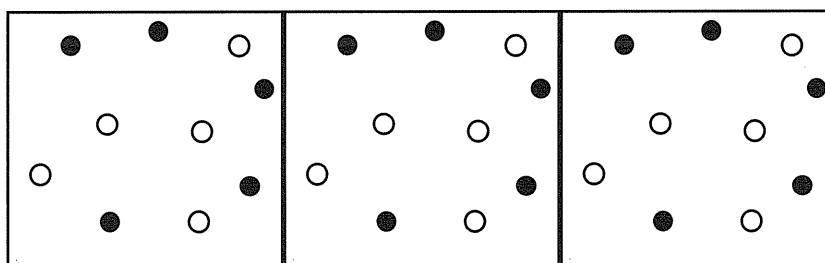


Empty Dots Only



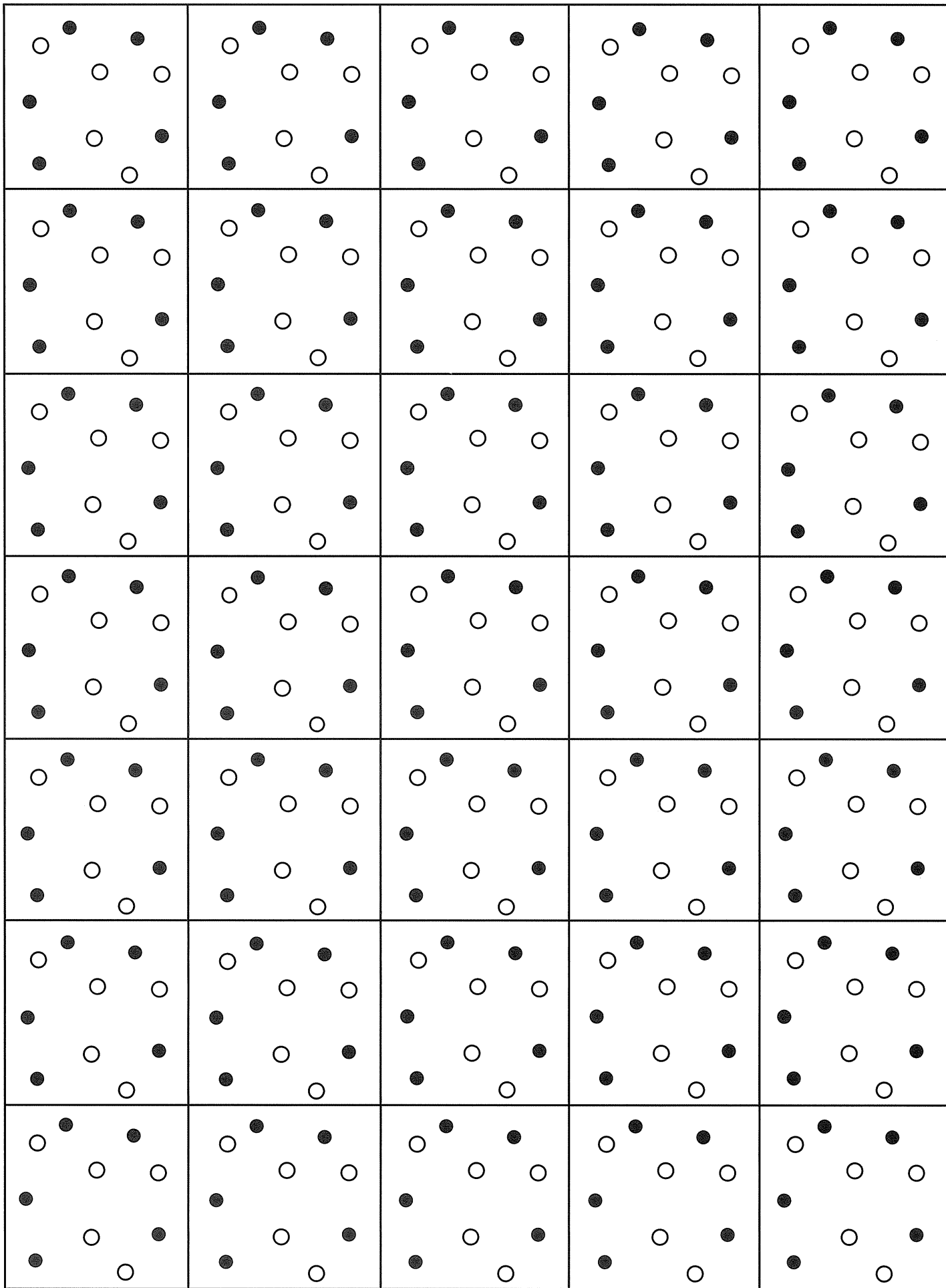
Top

Practice

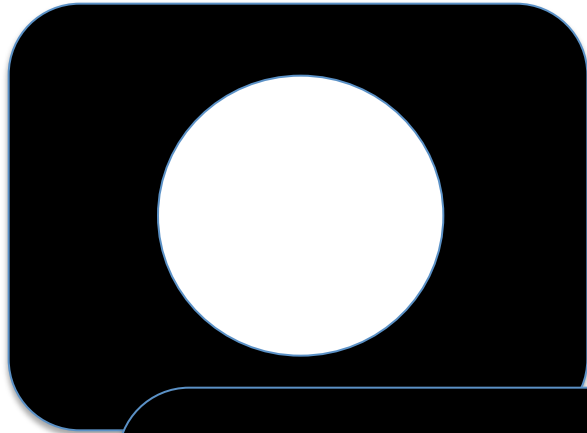


Switching

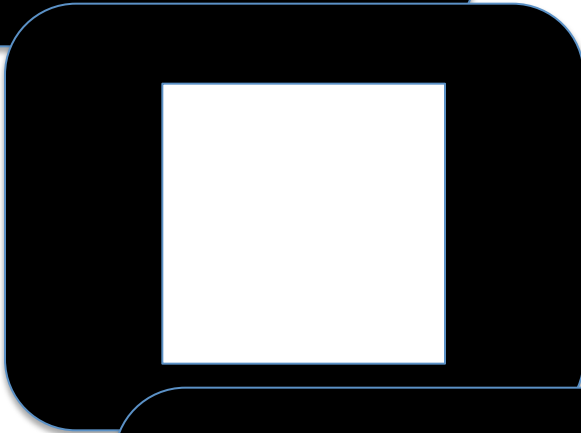
Top



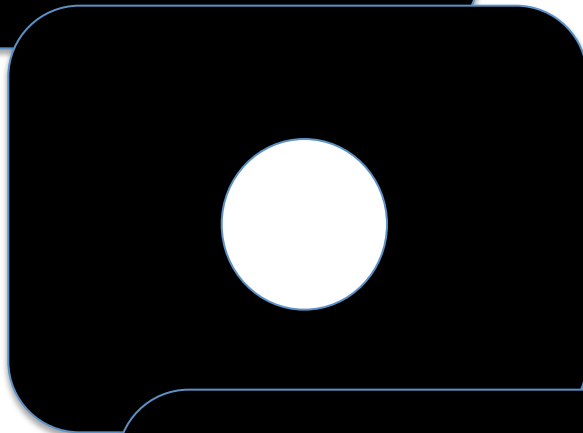
Go/No-Go Task



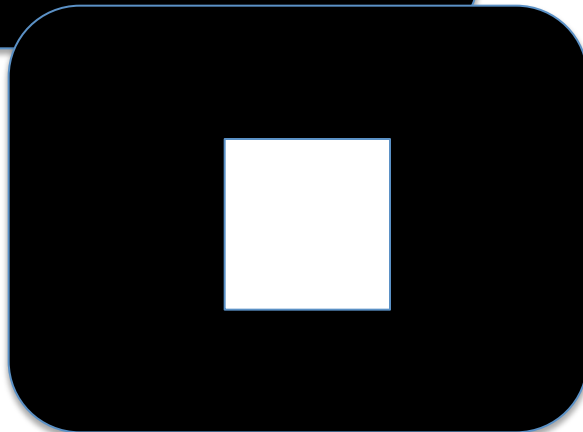
Go



Go



Go



No Go



Brief Visuospatial Memory Test- Revised

Response Form

Ralph H. B. Benedict, PhD

Test Date ____ / ____ / ____

ID# _____

Gender _____ Ethnicity _____ Handedness _____ Age _____

Education _____ Examiner _____

Form Administered: 1 2 3 4 5 6 (circle one)

	Raw score	T score	Percentile
Trial 1			
Trial 2			
Trial 3			
Total Recall ¹			
Learning ²			
Delayed Recall			
Percent Retained ³			
Recognition Hits			
Recognition False Alarms			
Recognition Discrimination Index ⁴			
Recognition Response Bias			
Copy (optional)			

Normative table/comparison group _____

¹Total Recall = (Trial 1 raw score + Trial 2 raw score + Trial 3 raw score).

²Learning = (Higher value of Trial 2 raw score or Trial 3 raw score) – Trial 1 raw score.

³Percent Retained = [Delayed Recall raw score ÷ (higher value of Trial 2 raw score or Trial 3 raw score)] × 100.

⁴Recognition Discrimination Index = Recognition Hits raw score – Recognition False Alarms raw score.

Delay Interval Table

Time Trial 3 completed	
Time Delayed Recall started	
Delay interval (minutes)	

T-1



Brief Visuospatial Memory Test- Revised

Response Form

Ralph H. B. Benedict, PhD

Test Date ____ / ____ / ____

ID# _____

Gender _____ Ethnicity _____ Handedness _____ Age _____

Education _____ Examiner _____

Form Administered: 1 2 3 4 5 6 (circle one)

	Raw score	T score	Percentile
Trial 1			
Trial 2			
Trial 3			
Total Recall ¹			
Learning ²			
Delayed Recall			
Percent Retained ³			
Recognition Hits			
Recognition False Alarms			
Recognition Discrimination Index ⁴			
Recognition Response Bias			
Copy (optional)			

Normative table/comparison group _____

¹Total Recall = (Trial 1 raw score + Trial 2 raw score + Trial 3 raw score).

²Learning = (Higher value of Trial 2 raw score or Trial 3 raw score) – Trial 1 raw score.

³Percent Retained = [Delayed Recall raw score ÷ (higher value of Trial 2 raw score or Trial 3 raw score)] x 100.

⁴Recognition Discrimination Index = Recognition Hits raw score – Recognition False Alarms raw score.

Delay Interval Table

Time Trial 3 completed	
Time Delayed Recall started	
Delay interval (minutes)	

T-1

T-2

T-3

DR

CT

Subject ID: _____

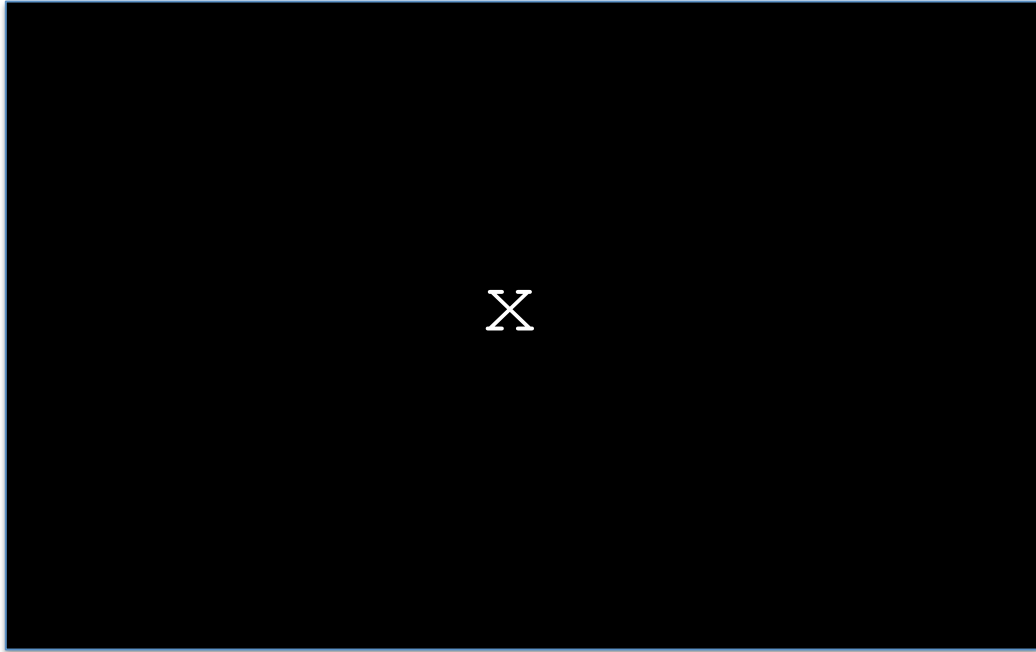
Date: _____

Please rate each of the following items in terms of how characteristic they are of you. Use the following scale for answering these items.

1 extremely uncharacteristic of me	2	3	4	5 extremely characteristic of me	
Once in a while I can't control the urge to strike another person.	1	2	3	4	5
Given enough provocation, I may hit another person.	1	2	3	4	5
If somebody hits me, I hit back.	1	2	3	4	5
I get into fights a little more than the average person.	1	2	3	4	5
If I have to resort to violence to protect my rights, I will.	1	2	3	4	5
There are people who pushed me so far that we came to blows.	1	2	3	4	5
I can think of no good reason for ever hitting a person.	1	2	3	4	5
I have threatened people I know.	1	2	3	4	5
I have become so mad that I have broken things.	1	2	3	4	5
I tell my friends openly when I disagree with them.	1	2	3	4	5
I often find myself disagreeing with people.	1	2	3	4	5
When people annoy me, I may tell them what I think of them.	1	2	3	4	5
I can't help getting into arguments when people disagree with me.	1	2	3	4	5
My friends say that I'm somewhat argumentative.	1	2	3	4	5
I flare up quickly but get over it quickly.	1	2	3	4	5
When frustrated, I let my irritation show.	1	2	3	4	5
I sometimes feel like a powder keg ready to explode.	1	2	3	4	5
I am an even-tempered person.	1	2	3	4	5
Some of my friends think I'm a hothead.	1	2	3	4	5
Sometimes I fly off the handle for no good reason.	1	2	3	4	5
I have trouble controlling my temper.	1	2	3	4	5
I am sometimes eaten up with jealousy.	1	2	3	4	5
At times I feel I have gotten a raw deal out of life.	1	2	3	4	5
Other people always seem to get the breaks.	1	2	3	4	5
I wonder why sometimes I feel so bitter about things.	1	2	3	4	5
I know that "friends" talk about me behind my back.	1	2	3	4	5
I am suspicious of overly friendly strangers.	1	2	3	4	5

Psychomotor Vigilance Test

Press the spacebar every time an “x” appears on the screen.



Session 1

ID# _____ Date _____ Time _____ AM
PM**PITTSBURGH SLEEP QUALITY INDEX****INSTRUCTIONS:**

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

1. During the past month, what time have you usually gone to bed at night?

BED TIME _____

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

NUMBER OF MINUTES _____

3. During the past month, what time have you usually gotten up in the morning?

GETTING UP TIME _____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.)

HOURS OF SLEEP PER NIGHT _____

For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you . . .

- a) Cannot get to sleep within 30 minutes

Not during the past month _____	Less than once a week _____	Once or twice a week _____	Three or more times a week _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------

- b) Wake up in the middle of the night or early morning

Not during the past month _____	Less than once a week _____	Once or twice a week _____	Three or more times a week _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------

- c) Have to get up to use the bathroom

Not during the past month _____	Less than once a week _____	Once or twice a week _____	Three or more times a week _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------

d) Cannot breathe comfortably

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

e) Cough or snore loudly

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

f) Feel too cold

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

g) Feel too hot

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

h) Had bad dreams

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

i) Have pain

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

j) Other reason(s), please describe_____

How often during the past month have you had trouble sleeping because of this?

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

6. During the past month, how would you rate your sleep quality overall?

Very good _____

Fairly good _____

Fairly bad _____

Very bad _____

7. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all	_____
Only a very slight problem	_____
Somewhat of a problem	_____
A very big problem	_____

10. Do you have a bed partner or room mate?

No bed partner or room mate	_____
Partner/room mate in other room	_____
Partner in same room, but not same bed	_____
Partner in same bed	_____

If you have a room mate or bed partner, ask him/her how often in the past month you have had . . .

- a) Loud snoring

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

- b) Long pauses between breaths while asleep

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

- c) Legs twitching or jerking while you sleep

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

d) Episodes of disorientation or confusion during sleep

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

e) Other restlessness while you sleep; please describe_____

Not during the past month_____	Less than once a week_____	Once or twice a week_____	Three or more times a week_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

STAI Form S

Subject # _____ Date: _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now, THAT IS, at this moment.

There are no right or wrong answers.
Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	Somewhat	Moderately so	Very much so
1. I feel calm.	1	2	3	4
2. I feel secure.	1	2	3	4
3. I am tense	1	2	3	4
4. I feel regretful	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes.	1	2	3	4
8. I feel rested.	1	2	3	4
9. I feel anxious	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident.	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel "high strung"	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel over-excited and "rattled".	1	2	3	4
19. I feel joyful.	1	2	3	4
20. I feel pleasant.	1	2	3	4

STAI Form T

Subject # _____ DATE _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you generally feel.

There are no right or wrong answers.
Do not spend too much time on any
one statement but give the answer
which seems to describe how you
generally feel.

	Almost never	Sometimes	Often	Almost always
21. I feel pleasant	1	2	3	4
22. I tire quickly	1	2	3	4
23. I feel like crying	1	2	3	4
24. I wish I could be as happy as others seem to be	1	2	3	4
25. I am losing out on things because I can't make up my mind soon enough	1	2	3	4
26. I feel rested	1	2	3	4
27. I am "calm, cool, and collected"	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29. I worry too much over something that really doesn't matter	1	2	3	4
30. I am happy	1	2	3	4
31. I am inclined to take things hard	1	2	3	4
32. I lack self-confidence	1	2	3	4
33. I feel secure	1	2	3	4
34. I try to avoid facing a crises or difficulty	1	2	3	4
35. I feel blue	1	2	3	4
36. I am content	1	2	3	4
37. Some unimportant thought runs through my mind and bothers me	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39. I am a steady person	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4



ANAM4™

Automated Neuropsychological Assessment Metrics

Quick Start Guide

Scope of This Document

This is a quick start reference to familiarize a first-time user with the basic concepts and operations of the ANAM4™ software.

Disclaimer

The ANAM4™ testing system does not constitute the practice of medicine or the provision of professional health care advice. The information provided by ANAM4™ software is of a general nature and does not represent medical advice, a diagnosis, or prescription for treatment. You are advised to seek the advice of a qualified medical professional or researcher for interpretation of test results. C-SHOP and the University of Oklahoma are not responsible for any decisions made based on information obtained using ANAM4™ software. Your qualified medical professional has the sole responsibility for establishing diagnosis and suggesting appropriate treatment.

Further Reading

For additional information regarding ANAM4™ or ANAM4™ data files, please refer to the ANAM4™ User Guide.

Revision 3, March 2007

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Requirements

Hardware Requirements

The ANAM4™ system is designed for use on personal computer systems. Minimum hardware requirements include the following:

- **Processor speed:** Pentium 90 MHz microprocessor.
- **Memory:** 32 MB RAM.
- **Storage:** The core ANAM4™ test system requires a minimum of approximately 25MB. Due to data storage requirements and to ensure optimal performance, at least 150MB of free space is highly recommended. A full ANAM4™ installation including ancillary modules (ADEPT™/APR™) requires approximately 50MB of space (130MB if the .NET Framework v2.0 is not already present). Due to data storage requirements and to ensure optimal performance, at least 300MB of free space prior to installation is highly recommended.
- **Response device:** Most standard input devices are supported, including a serial mouse, USB mouse and keyboard, and PS/2 mouse and keyboard. When using laptop computers, most internal keyboards and pointing devices will be adequate for most ANAM4 test modules, but the use of external input devices is highly recommended where practical.

Software Requirements

- **Operating system:** Windows 95/98/2000, NT4.0, or XP. To date, ANAM4™ has not been fully tested on Windows ME or Windows Vista.
- **Windows updates:** Application of all Windows updates. Updates are available at: <http://update.microsoft.com>
- **Flash animation:** For operating systems older than Windows XP, Adobe Flash Player is required to view the opening logo screen. Flash may be acquired via free download: <http://www.adobe.com/go/getflashplayer>

Note: When installing Flash Player via the website, uncheck the accompanying Yahoo toolbar before clicking "Install Now" unless you desire the toolbar.

1 Installing and Running ANAM4™

The ANAM4™ test system consists of a library of tests designed for a broad spectrum of clinical and research applications. This library of computer-based tests was constructed to meet the need for precise measurement of cognitive processing efficiency in a variety of psychological assessment contexts that include neuropsychology, readiness to perform, neurotoxicology, pharmacology, and human factors research.

ANAM4™ will be automatically installed from the installation CD. If the installation does not begin automatically, click Start > Run on the task bar. Type your CD drive letter followed by :\\Setup (e.g., D:\\Setup or E:\\Setup). Finally, click **OK** to proceed with the installation.

The default installation directory is C:\\Program Files\\C-SHOP\\ANAM4.



Upon installation, a desktop icon for ANAM4™ will be created.

To run ANAM4™, double-click on the ANAM4™ icon located on your desktop, the AnamMenu.exe file located in the C:\\Program Files\\C-SHOP\\ANAM4 directory, or the ANAM4 program listed in start->Programs->ANAM4.

2 Starting ANAM4™

Starting ANAM4™

1. Double-click the ANAM4 icon on your desktop.

ANAM4 Splash Screen

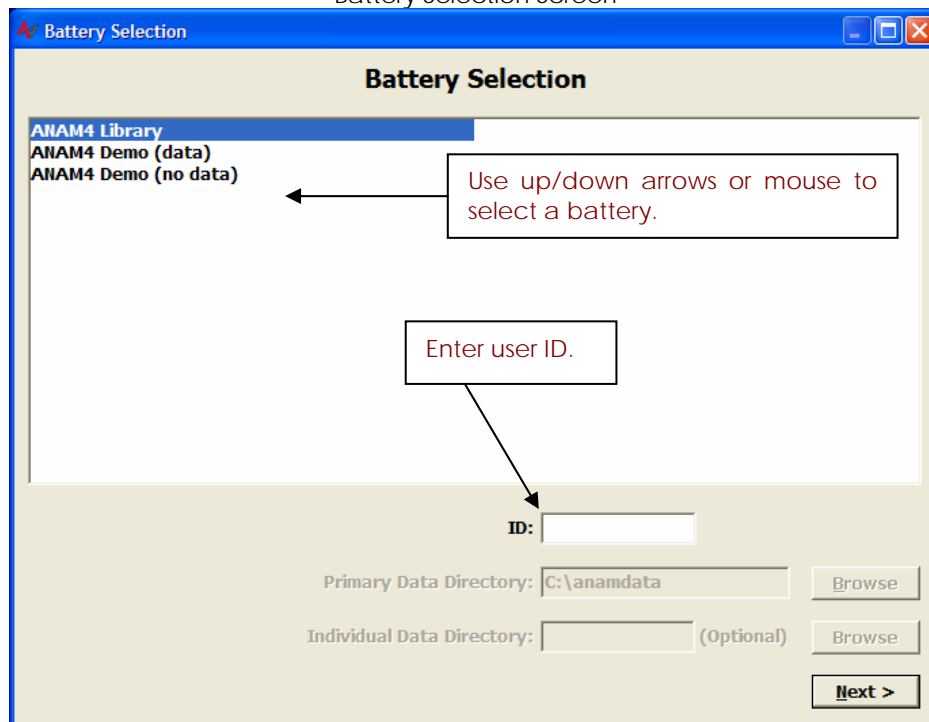


Selecting a Battery and Entering the User ID

The *Battery Selection* screen allows the user to choose a battery, specify an ID number, and specify data directories.

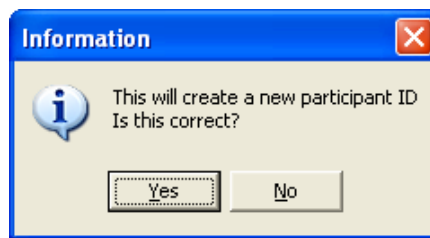
1. Use the up/down cursor keys or mouse to select the desired ANAM4™ battery.

Battery Selection Screen

The image shows the 'Battery Selection' window. The title bar says 'Battery Selection'. The main area has a list box titled 'ANAM4 Library' containing 'ANAM4 Demo (data)' and 'ANAM4 Demo (no data)'. A callout box with an arrow points to this list, saying 'Use up/down arrows or mouse to select a battery.' Below the list is a text input field labeled 'ID:' with a callout box saying 'Enter user ID.' At the bottom, there are two text input fields: 'Primary Data Directory: C:\anamdata' and 'Individual Data Directory: (Optional)'. Each has a 'Browse' button next to it. A 'Next >' button is at the bottom right.

2. Enter a user ID. The user ID can be any alphanumeric character string.

Note: If a test ID is entered that has never been used on this computer, you will be asked to verify that you are creating a new participant ID. If this is correct, click **Yes**. If the session is a repeat administration for this person (thus, the participant ID has been used previously), you will not receive this prompt.



Changing Data Directories (Folders)

The default data storage directory is C:\anamdata. All data files will be stored in this directory unless specified otherwise.

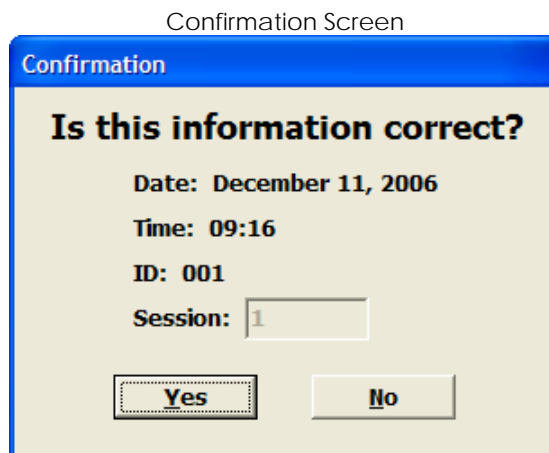
To change the Primary Data Directory or Individual Data Directory:

1. Press <Alt><F1>. This will unlock the *Primary Data Directory* and *Individual Data Directory* fields for modification.
2. Type the path location of the directory for data storage or click **Browse**. If you select Browse, navigate to the directory where you would like to store the ANAM data files.

After confirming all information on the *Battery Selection* screen, Press **Enter** or click **Next** to continue.

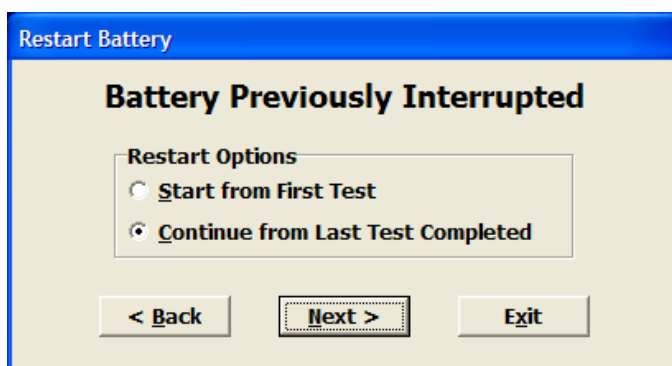
Confirming Date, Time, ID, and Session Number

1. Confirm that the Date and Time on your computer are accurately set. If not, click on **No**, close the *Battery Selection* screen that reappears by clicking on the red close button at the upper right corner, correct the Date/Time setting, and restart ANAM4™.
2. Confirm that the correct Session number is about to be run. If you are certain that it needs to be changed, press <Alt><F1> to unlock the field and enter the desired session number.



Restarting a Previously Cancelled Battery

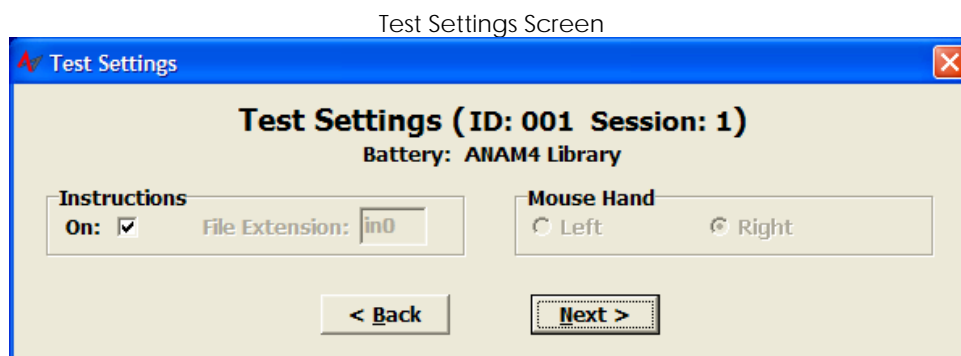
1. If the specified Session was previously canceled before completion, you may see the following screen asking if you wish to *Start from First Test* or *Continue from Last Test Completed*. You are also allowed to go back to the *Battery Selection* screen.



2. Once you have selected the desired option, click on **Next** to continue.

Selecting Test Settings

The *Test Settings* screen allows the user to customize the ANAM4™ test session.



Note: After using the battery a few times for a particular person, you may wish to turn off instructions by deselecting the "Instructions" box. Make sure it is checked **On** the first time through.

1. If you have a participant who uses the computer mouse with the left hand and you wish to obtain responses using the left hand, press **<Alt><F1>** to unlock the Mouse Hand setting and select **Left**.
2. If the Test Settings are correct, press **Enter** or click on **Next** to begin the testing.

Selecting a Specific Test or Subset of Tests

1. If you wish to select a single test or subset of tests, press **<Alt><F2>** and then click on **Select** under Type of Run.

Expanded Test Settings Screen

Test Settings (ID: 001 Session: 1)
Battery: ANAM4 Library

Instructions
On: ☒ File Extension: in0

Mouse Hand
☐ Left ☒ Right

Test Parameters

Language
English

Feedback Mode
☒ None ☐ Negative
☐ Positive ☐ Both

Type
☒ Practice ☐ Select ☐ Restart ☐ Entire

Random Number Seed
☐ Fixed ☒ Session ☐ Random

Fixed Seed

Type of Run
☒ Select ☐ Restart ☐ Entire

Mode of Run
☐ Paused ☒ Continuous

Response Device
☐ Key ☒ Mouse ☐ Mouse/Tone

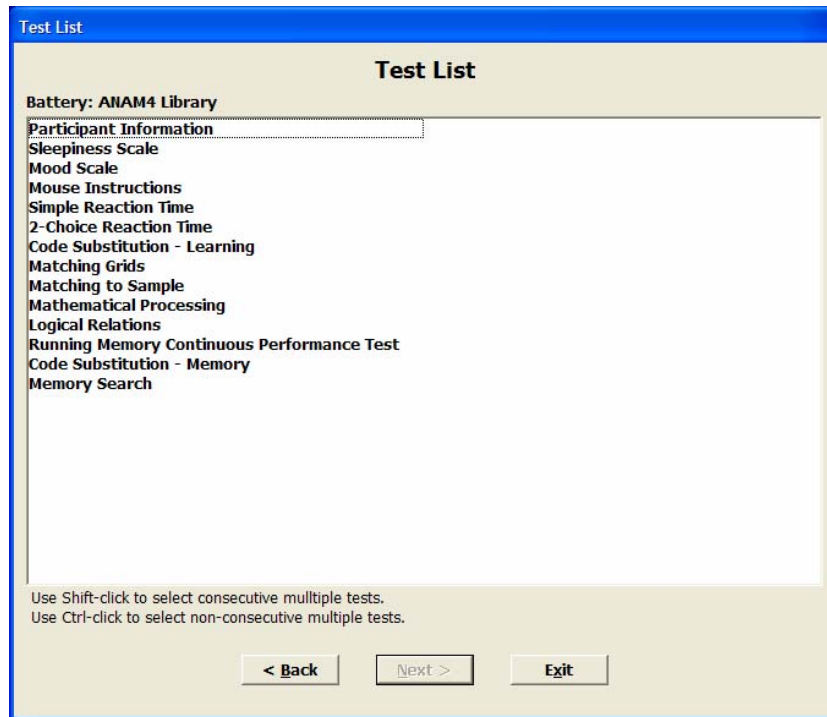
Response Keys WDJI

Test Results
☐ Show Test Results

Battery Results
☐ Show ☐ Save

Click on "Select."

2. Press **Enter** or click on **Next** to continue. The list of tests within the battery will appear on the next screen.



3. After selecting the desired test or set of tests using the instructions at the bottom of the screen, press **Enter** or click on **Next** to continue.

Proceeding through the Battery

1. Tests will proceed in sequence.

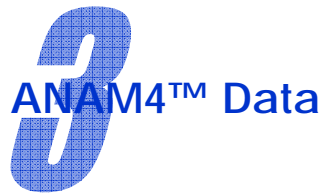
Note: If instructions are On, the typical sequence for each test is one or more pages of instructions, a screen with the test name, the test itself, and (if selected from the *Test Settings* screen) a feedback screen summarizing individual Test Results.

2. If you wish to abort from any test (end the test without collecting data), press **<Alt><F1>** at any time following the instructions screen(s).

Note: The **<Alt><F1>** exit function works ONLY after the display of test instructions is complete.



3. After the test aborts, you will see the above window. If you wish to cancel the rest of the battery, click **Yes**. If you wish to continue with the remaining tests, click **No**.
4. At the conclusion of the battery, you will see a "Thank You" message informing you that the Test Battery is complete.



Four types of data files are generated following test administration through the ANAM4™ test system as follows:

- Summary Data Files in Text Format (CSV) – summary statistics computed across all items/trials of a given test (without variable labels)
- Raw Data Files in Text Format (CSV) – individual item/trial information (without variable labels)
- Summary Data Files in XML Format – summary statistics computed across all items/trials of a given test (with variable labels)
- Raw Data Files in XML Format – Individual item/trial information (with variable labels).

File Naming

Data filenames are coded in the following manner. The first letter represents the type of file as follows:

- **S** for summary data in text format
- **R** for raw data in text format
- **X** for summary data in XML format
- **Z** for raw data in XML format.

The next sequence of characters corresponds to the participant ID code (of variable length). The ID code is followed by a P or T designating a Practice or Test session, respectively. The final portion of the filename indicates the session number. A three-letter file extension is used to identify the specific test. A list of test extensions can be found in

Chapter 4.

Example: **S32545T01.SRT** is a summary data file for participant 32545 for Test Session number 1 of the Simple Reaction Time test.

ANAM4™ Data Directories

The default *Primary Data Directory* is C:\anamdata. Data from all completed tests will be saved in this directory. By default, no *Individual Data Directory* is specified. For information on changing the *Primary Data Directory* or *Individual Data Directory*, see **Chapter 2.**

4 ANAM4™ Tests

ANAM4™ Test Names, Modules, and Extensions

Test Name	Module Name (.exe)	Extension
2-Choice Reaction Time	2choice	.2ch
4-Choice Reaction Time	4choice	.4ch
Code Substitution		
Learning	codesub	.cds
Immediate	codesub	.cdi
Delayed	codesub	.cdd
Demographics	demog	.sub
Digit Reaction Time	digitrt	.drt
Dual Task (Tracking / Memory)	dualtask	.dtn
Grammatical Reasoning	gram	.gm
Logical Relations	logical	.lrs
Manikin	manikin	.mkn
Matching Grids	matching	.mtg
Matching to Sample	mat2samp	.m2s
Mathematical Processing	math	.mth
Memory Search	stern	.stn
Mental State Exam	mse	.mse
Mood Scale	mood	.moo
Procedural Reaction Time	procr	.pro
Pursuit Tracking	pursuit	.pur
Reaction Time	react	.rct
Relative Judgment	reljudg	.rlj
Running Memory CPT	runcpt	.cpt
Simple Reaction Time	simplert	.srt
Sleepiness Scale	sleepsc	.slp
Spatial Processing - Simultaneous	dspat	.spd
Spatial Processing - Delayed	spat	.spa
Standard CPT	stdcpt	.scp
Stroop Test	stroop	.str
Switching	switch	.swt
Symbolic Reaction Time	symbolrt	.sym
Tapping	tapping	.tpl, .tpr
Tower Puzzle	tower	.atp
Unstable Tracking	track	.trk
Visual Vigilance	visvig	.vis

For More Information

ANAM4™ User Manual

www.c-shop.ou.edu/literature/manual.pdf

Quick Start Guide for the ADEPT™ Software

www.c-shop.ou.edu/literature/ADEPTquickstart.pdf

Quick Start Guide for the APR™ Software

www.c-shop.ou.edu/literature/APRquickstart.pdf

ANAM4™ Technical Literature

www.c-shop.ou.edu

Technical Support

www.c-shop.ou.edu



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Subject ID: _____ Marital Status: _____ Age: _____ Sex: _____

Occupation: _____ Education: _____

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

- 0 I do not feel sad.
- 1 I feel sad much of the time.
- 2 I am sad all the time.
- 3 I am so sad or unhappy that I can't stand it.

2. Pessimism

- 0 I am not discouraged about my future.
- 1 I feel more discouraged about my future than I used to be.
- 2 I do not expect things to work out for me.
- 3 I feel my future is hopeless and will only get worse.

3. Past Failure

- 0 I do not feel like a failure.
- 1 I have failed more than I should have.
- 2 As I look back, I see a lot of failures.
- 3 I feel I am a total failure as a person.

4. Loss of Pleasure

- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from the things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

6. Punishment Feelings

- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

7. Self-Dislike

- 0 I feel the same about myself as ever.
- 1 I have lost confidence in myself.
- 2 I am disappointed in myself.
- 3 I dislike myself.

8. Self-Criticalness

- 0 I don't criticize or blame myself more than usual.
- 1 I am more critical of myself than I used to be.
- 2 I criticize myself for all of my faults.
- 3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

10. Crying

- 0 I don't cry any more than I used to.
- 1 I cry more than I used to.
- 2 I cry over every little thing.
- 3 I feel like crying, but I can't.

Subtotal Page 1

Continued on Back

11. Agitation

- 0 I am no more restless or wound up than usual.
- 1 I feel more restless or wound up than usual.
- 2 I am so restless or agitated that it's hard to stay still.
- 3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

- 0 I have not lost interest in other people or activities.
- 1 I am less interested in other people or things than before.
- 2 I have lost most of my interest in other people or things.
- 3 It's hard to get interested in anything.

13. Indecisiveness

- 0 I make decisions about as well as ever.
- 1 I find it more difficult to make decisions than usual.
- 2 I have much greater difficulty in making decisions than I used to.
- 3 I have trouble making any decisions.

14. Worthlessness

- 0 I do not feel I am worthless.
- 1 I don't consider myself as worthwhile and useful as I used to.
- 2 I feel more worthless as compared to other people.
- 3 I feel utterly worthless.

15. Loss of Energy

- 0 I have as much energy as ever.
- 1 I have less energy than I used to have.
- 2 I don't have enough energy to do very much.
- 3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

- 0 I have not experienced any change in my sleeping pattern.
- 1a I sleep somewhat more than usual.
- 1b I sleep somewhat less than usual.
- 2a I sleep a lot more than usual.
- 2b I sleep a lot less than usual.
- 3a I sleep most of the day.
- 3b I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

- 0 I am no more irritable than usual.
- 1 I am more irritable than usual.
- 2 I am much more irritable than usual.
- 3 I am irritable all the time.

18. Changes in Appetite

- 0 I have not experienced any change in my appetite.
- 1a My appetite is somewhat less than usual.
- 1b My appetite is somewhat greater than usual.
- 2a My appetite is much less than before.
- 2b My appetite is much greater than usual.
- 3a I have no appetite at all.
- 3b I crave food all the time.

19. Concentration Difficulty

- 0 I can concentrate as well as ever.
- 1 I can't concentrate as well as usual.
- 2 It's hard to keep my mind on anything for very long.
- 3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

- 0 I am no more tired or fatigued than usual.
- 1 I get more tired or fatigued more easily than usual.
- 2 I am too tired or fatigued to do a lot of the things I used to do.
- 3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than I used to be.
- 2 I am much less interested in sex now.
- 3 I have lost interest in sex completely.



WASI-II

WECHSLER ABBREVIATED SCALE
OF INTELLIGENCE® — SECOND EDITION

Record Form

Calculation of Examinee's Age

Year Month Day

Test Date

ID: _____

Sex: ☐ F ☐ M

Handedness: ☐ R ☐ L

Test Age

Address/School/Testing Site: _____

Highest Education/Grade: _____

Examiner Name: _____

Total Raw Score to T Score Conversion

Subtest	Raw Score	T Scores
Block Design	<input type="text"/>	<input type="text"/>
Vocabulary	<input type="text"/>	<input type="text"/>
Matrix Reasoning	<input type="text"/>	<input type="text"/>
Similarities	<input type="text"/>	<input type="text"/>

Sum of T Scores

Verbal
Comp.

Perc.
Rsng.

Full
Scale-4

Full
Scale-2

Examinee Visual/Hearing Aids During Testing

Check type of aid examinee needed:	Used	Not Used
<input type="checkbox"/> Glasses	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Prescription Lenses	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Assisted Listening Device	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other:	<input type="checkbox"/>	<input type="checkbox"/>

Sum of T Scores to Composite Score Conversion

Scale	Sum of T Scores	Composite Score	Percentile Rank	Confidence Interval 90% or 95%
Verbal Comp.	<input type="text"/>	VCI <input type="text"/>	<input type="text"/>	<input type="text"/>
Perc. Rsng.	<input type="text"/>	PRI <input type="text"/>	<input type="text"/>	<input type="text"/>
Full Scale-4	<input type="text"/>	FSIQ-4 <input type="text"/>	<input type="text"/>	<input type="text"/>
Full Scale-2	<input type="text"/>	FSIQ-2 <input type="text"/>	<input type="text"/>	<input type="text"/>

Ranges of Expected Scores

Scores:	Confidence Level	
	90%	68%
FSIQ-4	<input type="text"/>	<input type="text"/>
WISC-IV FSIQ	<input type="text"/>	<input type="text"/>
WAIS-IV FSIQ	<input type="text"/>	<input type="text"/>

Subtest T Score Profile

	Verbal Comprehension		Perceptual Reasoning	
	VC	SI	BD	MR
80-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
75-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
70-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
65-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
60-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
55-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
50-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
45-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
40-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
35-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
30-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
25-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
20-	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Composite Score Profile

	VCI	PRI	FSIQ
160-	<input type="text"/>	<input type="text"/>	<input type="text"/>
155-	<input type="text"/>	<input type="text"/>	<input type="text"/>
150-	<input type="text"/>	<input type="text"/>	<input type="text"/>
145-	<input type="text"/>	<input type="text"/>	<input type="text"/>
140-	<input type="text"/>	<input type="text"/>	<input type="text"/>
135-	<input type="text"/>	<input type="text"/>	<input type="text"/>
130-	<input type="text"/>	<input type="text"/>	<input type="text"/>
125-	<input type="text"/>	<input type="text"/>	<input type="text"/>
120-	<input type="text"/>	<input type="text"/>	<input type="text"/>
115-	<input type="text"/>	<input type="text"/>	<input type="text"/>
110-	<input type="text"/>	<input type="text"/>	<input type="text"/>
105-	<input type="text"/>	<input type="text"/>	<input type="text"/>
100-	<input type="text"/>	<input type="text"/>	<input type="text"/>
95-	<input type="text"/>	<input type="text"/>	<input type="text"/>
90-	<input type="text"/>	<input type="text"/>	<input type="text"/>
85-	<input type="text"/>	<input type="text"/>	<input type="text"/>
80-	<input type="text"/>	<input type="text"/>	<input type="text"/>
75-	<input type="text"/>	<input type="text"/>	<input type="text"/>
70-	<input type="text"/>	<input type="text"/>	<input type="text"/>
65-	<input type="text"/>	<input type="text"/>	<input type="text"/>
60-	<input type="text"/>	<input type="text"/>	<input type="text"/>
55-	<input type="text"/>	<input type="text"/>	<input type="text"/>
50-	<input type="text"/>	<input type="text"/>	<input type="text"/>
45-	<input type="text"/>	<input type="text"/>	<input type="text"/>
40-	<input type="text"/>	<input type="text"/>	<input type="text"/>

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PsychCorp

1. Block Design



(Time limit: See item)



Start
Ages 6-8:
Item 1
Ages 9-90:
Item 3



Reverse
Ages 9-90: Does not obtain a perfect score on *either* Item 3 or Item 4, administer the preceding items in reverse order until two consecutive perfect scores are obtained.



Discontinue
After 2 consecutive scores of 0.



Stop
Ages 6-8:
After Item 11.



Record & Score
Items 1-4:
Score 0, 1, or 2 points.
Items 5-13:
Score 0, 4, 5, 6, or 7 points.

	Design	Presentation Method	Time Limit	Completion Time		Constructed Design		Score			
				Trial 1	Trial 2	Trial 1	Trial 2				
6-8	1. Examiner	Model and Picture	30"			Trial 1	Trial 2	0	1	2	
	2. Examiner	Model and Picture	30"			Trial 1	Trial 2	0	1	2	
9-90	3. Examiner	Model and Picture	45"			Trial 1	Trial 2	0	1	2	
	4. Examiner	Model and Picture	45"			Trial 1	Trial 2	0	1	2	
	5. Examiner	Picture	60"			Trial 1		0			21-60 16-20 11-15 1-10
	6. Examiner	Picture	60"			Trial 1		0			21-60 16-20 11-15 1-10
	7. Examiner	Picture	60"			Trial 1		0			21-60 16-20 11-15 1-10
	8. Examiner	Picture	60"			Trial 1		0			21-60 16-20 11-15 1-10
	9. Examiner	Picture	120"			Trial 1		0			71-120 46-70 31-45 1-30
	10. Examiner	Picture	120"			Trial 1		0			61-120 46-60 36-45 1-35
	11. Examiner	Picture	120"			Trial 1		0			61-120 46-60 36-45 1-35
6-8 STOP	12. Examiner	Picture	120"			Trial 1		0			61-120 46-60 36-45 1-35
	13. Examiner	Picture	120"			Trial 1		0			101-120 81-100 56-80 1-55

Maximum Raw Score

Ages 6-8: 57

Ages 9-90: 71

Block Design

Total Raw Score

2. Vocabulary



Start
Ages 6–90:
Item 4



Reverse
Ages 6–90: Does not obtain a perfect score on *either* Item 4 or Item 5, administer the preceding items in reverse order until two consecutive perfect scores are obtained.



Discontinue
After 3
consecutive
scores of 0.



Stop
Age 6:
After Item 22.
Ages 7–11:
After Item 25.
Ages 12–14:
After Item 28.



Record & Score
Items 1–3: Score 0 or 1 point.
Items 4–5: Score 0 or 2 points.
Items 6–31: Score 0, 1, or 2 points.
See the Manual for sample responses.




Item	Response	Score
1. Fish		0 1
2. Shovel		0 1
3. Shell		0 1
4. Shirt		0 2
5. Car		0 2
6. Lamp		0 1 2
7. Bird		0 1 2
8. Tongue		0 1 2
9. Pet		0 1 2
10. Lunch		0 1 2
11. Bell		0 1 2
12. Calendar		0 1 2
13. Alligator		0 1 2
14. Dance		0 1 2

If the examinee provides a 2-point response that requires feedback or gives an incorrect (0 point) response, provide corrective feedback as instructed in the Manual.

continue

2. Vocabulary *(continued)*

Discontinue after 3 consecutive scores of 0.

	Item	Response	Score
	15. Summer		0 1 2
	16. Reveal		0 1 2
	17. Decade		0 1 2
	18. Entertain		0 1 2
	19. Tradition		0 1 2
	20. Enthusiastic		0 1 2
	21. Improvise		0 1 2
	22. Haste		0 1 2
6	 23. Trend		0 1 2
	24. Impulse		0 1 2
	25. Ruminare		0 1 2
7-11	 26. Mollify		0 1 2
	27. Extirpate		0 1 2
	28. Panacea		0 1 2
12-14			

continue 

2. Vocabulary (continued)

Discontinue after 3 consecutive scores of 0.

Item	Response	Score
29. Perfunctory		0 1 2
30. Insipid		0 1 2
31. Pavid		0 1 2

Maximum Raw Score

Age 6: 41
Ages 7–11: 47
Ages 12–14: 53
Ages 15–90: 59

Vocabulary
Total Raw Score

3. Matrix Reasoning



Start
Ages 6–8:
Sample Items A & B,
then Item 1
Ages 9–90:
Sample Items A & B,
then Item 4



Reverse
Ages 9–90: Does not obtain a perfect score
on *either* Item 4 or Item 5, administer the
preceding items in *reverse* order until two
consecutive perfect scores are obtained.



Discontinue
After 3 consecutive
scores of 0.



Stop
Ages 6–8:
After Item 24.



Record & Score
Score 0 or 1 point.
Correct responses are in **color**.

	Item	Response					Score	
6–90	SA	1	2	3	4	5		
	SB	1	2	3	4	5		
6–8	1.	1	2	3	4	5	0	1
	2.	1	2	3	4	5	0	1
	3.	1	2	3	4	5	0	1
9–90	4.	1	2	3	4	5	0	1
	5.	1	2	3	4	5	0	1
	6.	1	2	3	4	5	0	1
	7.	1	2	3	4	5	0	1
	8.	1	2	3	4	5	0	1
	9.	1	2	3	4	5	0	1
	10.	1	2	3	4	5	0	1
	11.	1	2	3	4	5	0	1
	12.	1	2	3	4	5	0	1
	13.	1	2	3	4	5	0	1
	14.	1	2	3	4	5	0	1

	Item	Response					Score	
	15.	1	2	3	4	5	0	1
	16.	1	2	3	4	5	0	1
	17.	1	2	3	4	5	0	1
	18.	1	2	3	4	5	0	1
	19.	1	2	3	4	5	0	1
	20.	1	2	3	4	5	0	1
	21.	1	2	3	4	5	0	1
	22.	1	2	3	4	5	0	1
	23.	1	2	3	4	5	0	1
6–8 STOP	24.	1	2	3	4	5	0	1
	25.	1	2	3	4	5	0	1
	26.	1	2	3	4	5	0	1
	27.	1	2	3	4	5	0	1
	28.	1	2	3	4	5	0	1
	29.	1	2	3	4	5	0	1
	30.	1	2	3	4	5	0	1

Maximum Raw Score

Ages 6–8: 24
Ages 9–90: 30

Matrix Reasoning
Total Raw Score

4. Similarities



Start
Ages 6–8:
Item 1
Ages 9–90:
Item 4



Reverse
Ages 9–90: Does not obtain a perfect score on *either* Item 4 or Item 5, administer the preceding items in **reverse** order until two consecutive perfect scores are obtained.



Discontinue
After 3 consecutive scores of 0.



Stop
Ages 6–8:
After Item 22.



Record & Score
Items 1–3: Score 0 or 1 point.
Correct responses are in **color**.
Items 4–5: Score 0 or 2 points.
Items 6–24: Score 0, 1, or 2 points.
See Manual for sample responses.

Picture Item	Response	Score
6–8	1. 1 2 3 4 5 0 1	

Picture Item	Response	Score
2.	1 2 3 4 5 0 1	

Picture Item	Response	Score
3.	1 2 3 4 5 0 1	

Verbal Items	Response	Score
9–90	§† 4. Green–Blue	0 2
	§† 5. Square–Triangle	0 2
	6. Cow–Bear	0 1 2
	7. Shirt–Jacket	0 1 2
	8. Pen–Crayon	0 1 2
	9. Hat–Umbrella	0 1 2
	10. Airplane–Bus	0 1 2
	11. Door–Window	0 1 2
	12. Child–Adult	0 1 2


§If the examinee provides a response that suggests he or she does not understand the task, provide the specified prompt in the Manual.

†If the examinee provides a 2-point response that requires feedback or provides an incorrect (0 point) response, provide corrective feedback as instructed in the Manual.



4. Similarities (continued)

Discontinue after 3 consecutive scores of 0.

Verbal Items	Response	Score
13. Shoulder—Ankle		0 1 2
14. Love—Hate		0 1 2
15. Smooth—Rough		0 1 2
16. Hand—Flag		0 1 2
17. Wall—Line		0 1 2
18. Heat—Wind		0 1 2
19. More—Less		0 1 2
20. Shadow—Echo		0 1 2
21. Tradition—Habit		0 1 2
22. Peace—War		0 1 2
6-8  23. Time—Progress		0 1 2
24. Memory—Practice		0 1 2

Maximum Raw Score
Ages 6–8: 41
Ages 9–90: 45

Similarities
Total Raw Score



Examinee Name: _____ Age: _____

Parent/Guardian Name: _____

Examiner Name: _____

Record Form

Behavioral Observations

Referral source/Reason for referral/Presenting complaint(s)

Physical appearance

Language (e.g., first/native language, other language, English fluency, expressive and receptive language ability, articulation)

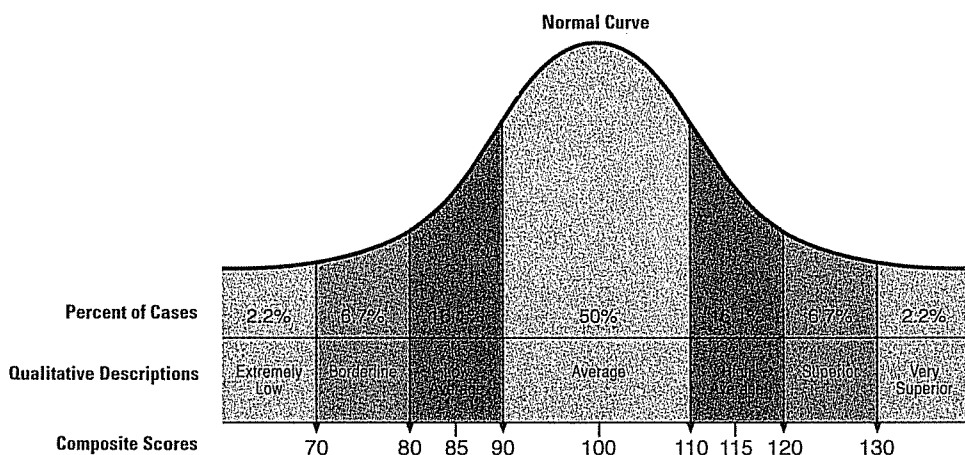
Attention and concentration

Attitude toward testing (e.g., rapport, eager to speak, working habits, interest, motivation, reaction to success/failure)

Affect/Mood

Unusual behaviors/Verbalizations (e.g., perseverations, stereotypic movements, bizarre and atypical verbalizations)

Other notes



PEARSON

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CD-RISC

Subject #:

Date: _____

Time: _____

Think about how you have been feeling over the past month. Using the scale below, please rate each of the following statements for how well they describe you **DURING THE PAST MONTH.**

0	1	2	3	4
not true at all	rarely true	sometimes true	often true	true nearly all the time

1. _____ Able to adapt to change
2. _____ Close and secure relationships
3. _____ Sometimes fate or God can help
4. _____ Can deal with whatever comes
5. _____ Past success gives confidence for new challenge
6. _____ See the humorous side of things
7. _____ Coping with stress strengthens
8. _____ Tend to bounce back after illness or hardship
9. _____ Things happen for a reason
10. _____ Best effort no matter what
11. _____ You can achieve your goals
12. _____ When things look hopeless, I don't give up
13. _____ Know where to turn for help
14. _____ Under pressure, focus and think clearly
15. _____ Prefer to take the lead in problem solving
16. _____ Not easily discouraged by failure
17. _____ Think of self as strong person
18. _____ Make unpopular or difficult decisions
19. _____ Can handle unpleasant feelings
20. _____ Have to act on a hunch
21. _____ Strong sense of purpose
22. _____ In control of your life
23. _____ I like challenges
24. _____ You work to attain your goals
25. _____ Pride in your achievements

Craig Handicap Assessment and Reporting Technique Scoring Short Form

1. How many hours in a typical 24-hour day do you have someone with you to provide physical assistance for personal care activities such as eating, bathing, dressing, toileting and mobility?

_____ hours paid assistance _____ hours unpaid (family, others)

- A. Total the hours of paid and unpaid care, multiply by 4, and subtract that number from 100.

**PHYSICAL
INDEPENDENCE**
100
minus

=

2. How much time is someone with you in your home to assist you with activities that require remembering, decision making, or judgment?

- 1 _____ Someone else is always with me to observe or supervise.
2 _____ Someone else is always around, but they only check on me now and then.
3 _____ Sometimes I am left alone for an hour or two.
4 _____ Sometimes I am left alone for most of the day
5 _____ I have been left alone all day and all night, but someone checks in on me.
6 _____ I am left alone without anyone checking on me.

- A. Assign points as follows: response #1 = 0 points; response #2 = 1 point; response #3 = 2 points; response #4 = 3 points; response #5 = 4 points; and response #6 = 5 points.

**COGNITIVE
INDEPENDENCE**

x11
=

- B. Multiply points in "A" by 11.

3. How much of the time is someone with you to help you with remembering, decision making, or judgment when you go away from your home?

- 1 _____ I am restricted from leaving, even with someone else.
2 _____ Someone is always with me to help with remembering, decision making or judgment when I go anywhere.
3 _____ I go to places on my own as long as they are familiar.
4 _____ I do not need help going anywhere.

- C. Assign points as follows: response #1 = 0 points; response #2 = 1 point; response #3 = 2 points; and response #4 = 3 points.

+

x15
=

- D. Multiply points in "C" by 15.

Add the sums of "B" and "D". If the total sum is greater than 100, enter 100.

4. On a typical day, how many hours are you out of bed? _____ hours
5. In a typical week, how many days do you get out of your house and go somewhere?
_____ days
6. In the last year, how many nights have you spent away from your home (excluding hospitalizations?)
_____ none _____ 1-2 _____ 3-4 _____ 5 or more

- A. Multiply the number of hours out of bed by 3.
- B. Multiply the number of days per week out of the house by 7.
- C. Assign points as follows: no nights out = 0; 1-2 nights out = 10; 3-4 nights out = 15; 5 or more nights = 20. If the total sum is greater than 100, enter 100.

Add the sums of "A", "B", and "C". If the total sum is greater than 100, enter 100.

MOBILITY

+

+

=

OCCUPATION

+

+

+

+

=

- A. Multiply the number of hours working by 2.5.
- B. Multiply the number of hours in school by 2.5.
- C. Multiply the number of hours in active homemaking by 2.5.
- D. Multiply the number of hours in home maintenance by 2.5.
- E. Multiply the number of recreational activities by 1.25

Add the sums of "A", "B", "C", "D", and "E". If the total sum is greater than 100, enter 100.

7. How many hours per week do you spend working in a job for which you get paid? hours _____
8. How many hours per week do you spend in school working toward a degree or in an accredited technical training program (including hours in class and studying)? hours _____
9. How many hours per week do you spend in active homemaking including parenting, housekeeping, and food preparation? _____ hours
10. How many hours per week do you spend in home maintenance activities such as gardening, house repairs or home improvement? _____ hours
11. How many hours per week do you spend in recreational activities such as sports, exercise, playing cards, or going to movies? Please do not include time spent watching TV or listening to the radio. _____ hours

SOCIAL INTEGRATION

12. How many people do you live with?

13. Is one of them your spouse or significant other?

14. of the people you live with how many are relatives?

15. How many business or organizational associates do you visit, phone, or write to at least once a month? _____ Associates

16. How many friends (non-relatives contacted outside business or organizational settings) do you visit, phone, or write to at least once a month? _____ Friends

17. With how many strangers have you initiated a conversation in the last month (for example, to ask information or place an order)?

none ____ 1-2 ____ 3-5 ____ 6 or more

A. Assign 38 points if living with spouse/partner OR assign 25 points if living with unrelated roommate and/or an attendant.

Add an additional six points for every relative that lives in the household.

B. Multiply number of business associates by 2.5. A maximum score for this component is 25 points.

C. If living with more than one roommate, add extra roommate to number of friends contacted monthly. Multiply by 13. A Maximum score for this component is 65 points.

D. Assign points as follows: none = 0 points; 1-2 = 15 points; 3-5 = 23 points; 6 or more = 30 points.

Add the sums from "A", "B", "C", and "D". If the total sum is greater than 100, enter 100.

_____.
+

_____.
+

_____.
+

_____.
+

_____.

=

**ECONOMIC
SELF
SUFFICIENCY**

18. Approximately what was the combined annual income, in the last year, of **all family members in your household**? (consider all sources including wages and earnings, disability benefits, pensions and retirement income, income from court settlements, investments and trust funds, child support and alimony, contributions from relatives, and any other source.)

- a. Less than 25,000 - If no ask e; if yes ask b
- b. Less than 20,000 - If no code 22500; if yes ask c
- c. Less than 15,000 - If no code 17500; if yes ask d
- d. Less than 10,000 - If no code 12500; if yes code 5000
- e. Less than 35,000 - If no ask f; if yes code 30000
- f. Less than 50,000 - If no ask g; if yes code 42500
- g. Less than 75,000 - If no code h; if yes code 62500
- h. 75,000 or more code 80000

- A. Calculate family size by adding respondent, plus partner (if living with respondent), plus other relatives in household.

Family size

(#19)
minus

19. Approximately how much did you pay last year for medical care expenses? (Consider any amounts paid by yourself or the family members in your household and **not reimbursed** by insurance or benefits.)

- a. Less than 1000 if "no" ask b if "yes" code 500.
- b. Less than 2500 if "no" ask c if "yes" code 1750.
- c. Less than 5000 if "no" ask d if "yes" code 3750.
- d. Less than 10000 if "no" code e if "yes" code 7500.
- e. 10000 or more code 15000

- B. Subtract the unreimbursed medical expenses from the annual income (amount in question #19 minus amount in question #20.

(#20)

=

- C. Determine poverty level from family size calculated in "A".

=

- D. Divide the value from "B" by the poverty level from "C".

divided by

- E. Multiply by 50

Poverty level

*50
=

=

If the total sum is greater than 100, enter 100.

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Laura Liljequist, PhD
Murray, KY



Revised and updated materials help increase the accuracy of personality assessment.

Purpose: 22 nonoverlapping full scales provide a comprehensive assessment of adult psychopathology in ages 18 years and older

Age Range: Adult
Elder Adult

Admin: Individual or group

Time: 50-60 minutes to administer; 15-20 minutes to score

Qualification: [C](#)

Sample Reports: N/A

Related Products: [PAI® Professional Report Service](#)

[PAI® Software Portfolio](#)

[Personality Assessment Inventory™-Adolescent](#)

With its newly revised Professional Manual, Profile Form Adults-Revised, and Critical Items Form-Revised, the PAI® continues to raise the standard for the assessment of adult psychopathology. This objective inventory of adult personality assesses psychopathological syndromes and provides information relevant for clinical diagnosis, treatment planning, and screening for psychopathology. Since its introduction, the PAI has been heralded as one of the most important innovations in the field of clinical assessment.

PAI® Scales and Subscales

The 344 PAI items constitute 22 nonoverlapping scales covering the constructs most relevant to a broad-based assessment of mental disorders: 4 validity scales, 11 clinical scales, 5 treatment scales, and 2 interpersonal scales. To facilitate interpretation and to cover the full range of complex clinical constructs, 10 scales contain conceptually derived subscales.

The PAI Clinical scales were developed to provide information about critical diagnostic features of 11 important clinical constructs. These 11 scales may be divided into three broad classes of disorders: those within the neurotic spectrum, those within the psychotic spectrum, and those associated with behavior disorder or impulse control problems.

The Treatment scales were developed to provide indicators of potential complications in treatment that would not necessarily be apparent from diagnostic information. These five scales include two indicators of potential for harm to self or others, two measures of the respondent's environmental circumstances, and one indicator of the respondent's motivation for treatment.

The Interpersonal scales were developed to provide an assessment of the respondent's interpersonal style along two dimensions: a warmly affiliative versus a cold rejecting style, and a dominating/controlling versus a meekly submissive style. These axes provide a useful way of conceptualizing many different mental disorders: persons at the extremes of these dimensions may present with a variety of disorders. A number of studies provide evidence that diagnostic groups differ on these dimensions.

The PAI includes a Borderline Features scale and an Antisocial Features scale. Both of these scales specifically assess character pathology. The Borderline Features scale is the only PAI scale that has four subscales, reflecting the factorial complexity of the construct. The Antisocial Features scale includes a total of three facets: one assessing antisocial behaviors, and the other two assessing antisocial traits.

Subject ID: _____

Date: _____

The following questions concern your alcohol consumption. Place an X in one box that best describes your answer to each question.

Questions	0	1	2	3	4	
1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week	
2. How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more	
3. How often do you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
4. How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
5. How often during the last year have you failed to do what was normally expected of you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
7. How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
8. How often during the last year have you been unable to remember what happened the night before because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
9. Have you or someone else been injured because of your drinking?	No		Yes, but not in the last year		Yes, during the last year	
10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?	No		Yes, but not in the last year		Yes, during the last year	
					Total	

Rivermead Post Concussion Symptoms Questionnaire

Modified (Rpq-3 And Rpq-13)⁴² Printed With Permission: Modified Scoring System From Eyres 2005 ²⁸

Subject ID:

Date:

After a head injury or accident some people experience symptoms that can cause worry or nuisance. We would like to know if you now suffer any of the symptoms given below. Because many of these symptoms occur normally, we would like you to compare yourself now with before the accident. For each symptom listed below please circle the number that most closely represents your answer.

0 = not experienced at all
1 = no more of a problem
2 = a mild problem
3 = a moderate problem
4 = a severe problem

Compared with **before** the accident, do you **now** (i.e., over the last 24 hours) suffer from:

	not experienced	no more of a problem	mild problem	moderate problem	severe problem
Headaches	0	1	2	3	4
Feelings of dizziness	0	1	2	3	4
Nausea and/or vomiting	0	1	2	3	4
Noise sensitivity (easily upset by loud noise)	0	1	2	3	4
Sleep disturbance	0	1	2	3	4
Fatigue, tiring more easily	0	1	2	3	4
Being irritable, easily angered	0	1	2	3	4
Feeling depressed or tearful	0	1	2	3	4
Feeling frustrated or impatient	0	1	2	3	4
Forgetfulness, poor memory	0	1	2	3	4
Poor concentration	0	1	2	3	4
Taking longer to think	0	1	2	3	4
Blurred vision	0	1	2	3	4
Light sensitivity (easily upset by bright light)	0	1	2	3	4
Double vision	0	1	2	3	4
Restlessness	0	1	2	3	4

Are you experiencing any other difficulties? Please specify, and rate as above.

1.	0	1	2	3	4
2.	0	1	2	3	4

Administration only:

RPQ-3 (total for first three items)	
RPQ-13 (total for next 13 items)	

Rivermead Post Concussion Symptoms Questionnaire (cont.)

Modified (Rpq-3 And Rpq-13)⁴² Printed With Permission: Modified Scoring System From Eyres 2005 ²⁸

Administration only

Individual item scores reflect the presence and severity of post concussive symptoms. Post concussive symptoms, as measured by the RPQ, may arise for different reasons subsequent to (although not necessarily directly because of) a traumatic brain injury. The symptoms overlap with broader conditions, such as pain, fatigue and mental health conditions such as depression⁷².

The questionnaire can be repeated to monitor a patient's progress over time. There may be changes in the severity of symptoms, or the range of symptoms. Typical recovery is reflected in a reduction of symptoms and their severity within three months.

Scoring

The scoring system has been modified from Eyres, 2005²⁴.

The items are scored in two groups. The first group (RPQ-3) consists of the first three items (headaches, feelings of dizziness and nausea) and the second group (RPQ-13) comprises the next 13 items. The total score for RPQ-3 items is potentially 0–12 and is associated with early symptom clusters of post concussive symptoms. If there is a higher score on the RPQ-3, earlier reassessment and closer monitoring is recommended.

The RPQ-13 score is potentially 0–52, where higher scores reflect greater severity of post concussive symptoms. The RPQ-13 items are associated with a later cluster of symptoms, although the RPQ-3 symptoms of headaches, dizziness and nausea may also be present. The later cluster of symptoms is associated with having a greater impact on participation, psychosocial functioning and lifestyle. Symptoms are likely to resolve within three months. A gradual resumption of usual activities is recommended during this period, appropriate to symptoms. If the symptoms do not resolve within three months, consideration of referral for specialist assessment or treatment services is recommended.

References:

Eyres, S., Carey, A., Gilworth, G., Neumann, V., Tennant, A. (2005). Construct validity and reliability of the Rivermead Post Concussion Symptoms Questionnaire. *Clinical Rehabilitation*, 19, 878-887.

King, N. S., Crawford, S., Wenden, F.J., Moss, N.E.G. Wade, D.T. (1995). The Rivermead Post Concussion Symptoms Questionnaire: a measure of symptoms commonly experienced after head injury and its reliability *Journal of Neurology*, 242, 587-592.

Potter, S., Leigh, E., Wade, D., Fleminger, S. (2006). The Rivermead Post Concussion Symptoms Questionnaire *Journal of Neurology*, October 1-12.

Subject ID: _____

Session: _____

Study: _____

Date: ____/____/____

Snaith-Hamilton Pleasure Scale

This questionnaire is designed to measure your ability to experience pleasure in the last few days.

It is important to read each statement very carefully.

Circle the answer that corresponds to how much you agree or disagree with each statement.

- | | | | | |
|---|-------------------|----------|----------|-------------------|
| 1. I would enjoy my favorite television or radio program. | Strongly Disagree | Disagree | Agree | Strongly Agree |
| 2. I would enjoy being with my family or close friends. | Definitely Agree | Agree | Disagree | Strongly Disagree |
| 3. I would find pleasure in my hobbies and past-times. | Strongly Disagree | Disagree | Agree | Strongly Agree |
| 4. I would be able to enjoy my favorite meal. | Definitely Agree | Agree | Disagree | Strongly Disagree |
| 5. I would enjoy a warm bath or refreshing shower. | Definitely Agree | Agree | Disagree | Strongly Disagree |
| 6. I would find pleasure in the scent of flowers or the smell
of a fresh sea breeze or freshly baked bread. | Strongly Disagree | Disagree | Agree | Strongly Agree |
| 7. I would enjoy seeing other people's smiling faces. | Definitely Agree | Agree | Disagree | Strongly Disagree |
| 8. I would enjoy looking smart when I have made
an effort with my appearance. | Strongly Disagree | Disagree | Agree | Strongly Agree |
| 9. I would enjoy reading a book, magazine, or newspaper. | Definitely Agree | Agree | Disagree | Strongly Disagree |
| 10. I would enjoy a cup of tea or coffee or my favorite drink. | Strongly Disagree | Disagree | Agree | Strongly Agree |
| 11. I would find pleasure in small things, e.g. bright sunny day,
a telephone call from a friend. | Strongly Disagree | Disagree | Agree | Strongly Agree |
| 12. I would be able to enjoy a beautiful landscape or view. | Definitely Agree | Agree | Disagree | Strongly Disagree |
| 13. I would get pleasure from helping others. | Strongly Disagree | Disagree | Agree | Strongly Agree |
| 14. I would feel pleasure when I receive praise from other people. | Definitely Agree | Agree | Disagree | Strongly Disagree |

Satisfaction with Life Scale

Below are five statements with which you may agree or disagree.

Indicate your agreement with each item by placing the appropriate number on the line preceding that item.

Please be open and honest in your responding.

The 7-point scale is as follows:

1 = strongly disagree

2 = disagree

3 = slightly disagree

4 = neither agree nor disagree

5 = slightly agree

6 = agree

7 = strongly agree

___ 1. In most ways my life is close to my ideal.

___ 2. The conditions of my life are excellent.

___ 3. I am satisfied with my life.

___ 4. So far I have gotten the important things I want in life.

___ 5. If I could live my life over, I would change almost nothing.

EDINBURGH HANDEDNESS SURVEY

Subject ID#: _____

Date: _____

Please indicate your preferences in the use of hands in the following activities by putting a + in the appropriate column. Where the preference is so strong that you would never try to use the other hand unless absolutely forced to, put ++. If in any case you are really indifferent put + in both columns.

Some of the activities require both hands. In these cases the part of the task, or object, for which the hand preference is wanted is indicated in brackets.

Please try to answer all the questions, and only leave a blank if you have no experience at all of the object or task.

		LEFT	RIGHT
1	Writing		
2	Drawing		
3	Throwing		
4	Scissors		
5	Toothbrush		
6	Knife [without fork]		
7	Spoon		
8	Broom [upper hand]		
9	Striking Match [match]		
10	Opening Box [lid]		

Do not write below this line

L.Q.: _____

DECILE: _____

M/USE QUESTIONNAIRE

SUBJECT #: _____

DATE: ____/____/____

Have you ever used marijuana?

For our purposes, marijuana usage is considered any instance in which you intentionally consumed (smoked, ingested, etc.) any quantity of marijuana.

☐ **NO** ☐ **YES**

At what age did you start? _____

At what specific age (in years) was your marijuana usage the heaviest? _____

During your lifetime, approximately how many occasions have you used marijuana?

☐ 0-50 ☐ 51-100 ☐ 101-500 ☐ 501s-1000 ☐ 1001-5000 ☐ over 5000

Consider the extent of marijuana use throughout your lifetime. Please approximate the number of times per month on average which you used marijuana at the following ages:

16-18 years of age	19-21 years of age	22-24 years of age	25-27 years of age	28-30 years of age	30+ years of age

During your lifetime, on average, how many times per month have you used marijuana?

In the past four weeks, did you use marijuana?


☐ **NO** ☐ **YES**

How often? _____ daily / weekly (*circle one*)

On average, how much do you consume per occasion? _____

If YES, please review the printed calendar reflecting all the days in the past month. Indicate the number of times you used marijuana on each of these days. If you abstained from marijuana use during a given day, please write a "0" on that day. Please fill out every day in the calendar with your best guess of marijuana use.

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AU4, page 2	Please approve the edits in the sentence “Table 3.1 represents the most recent...”	<input type="checkbox"/>
AU5, page 3	Please approve the edits in the sentence “A new lesion on follow-up MRI...”.	<input type="checkbox"/>
AU6, page 5	Please confirm if the “axial diffusivity” is same as “axonal diffusivity”.	<input type="checkbox"/>
AU7, page 5	We have changed “intera” to “interna” throughout the text. Please check and confirm the change if correct.	<input type="checkbox"/>
AU8, page 5	We have changed “forcepts” to “forceps” throughout the text. Please check and confirm the change if correct.	<input type="checkbox"/>

AU9, page 5	Please check the phrase for correctness: diffuse reduction.	<input type="checkbox"/>
AU10, page 2	Kindly check the source line of Fig. 3.1.	<input type="checkbox"/>

CHAPTER

3

c0003

White Matter Abnormalities in MS: Advances in Diffusion Tensor Imaging/Tractography

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University of Arizona, Tucson, AZ, United States

[AU1]

[AU2]

OUTLINE

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Neuroimaging in MS	2	Relationship Between DTI Measures and Cognitive Profile of MS	6
T1-Weighted Imaging	3	Relationship Between DTI Measures and Psychiatric Profile of MS	7
T1-Weighted Contrast Imaging	3		
T2-Weighted Imaging and FLAIR	3	Conclusions	7
Magnetic Resonance Spectroscopic Imaging	4	References	8
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s0010

A BRIEF OVERVIEW OF THE NEUROPATHOLOGY OF MULTIPLE SCLEROSIS

p0045

Multiple sclerosis (MS) is an acquired progressive inflammatory demyelinating condition affecting the central nervous system (CNS) that often presents with a relapsing and remitting course. To understand the symptoms and presentation of MS, it is crucial to first understand the basic neuropathology and associated neuroanatomy that is affected by the disease. MS generally involves neuropathology affecting three primary features of the neuron and surrounding tissue. These features are lesions, inflammation, and damage to the myelin sheath that surrounds the axons of a neuron. As shown in Fig. 3.1, a neuron is composed of cell body with branch-like dendrites and a longer fiber projection called an axon. It is the axons that permit neural communication over significant distances within the nervous system. A neural signal originating in the cell body travels along the axon and terminates at the synaptic bouton, where neurotransmitters are released into the synapse to

stimulate adjacent neurons. The terms gray matter (GM) and white matter (WM) are often used to describe various aspects of these neuronal tissues. Specifically, brain tissue such as the cerebral cortex is often labeled as GM because it comprises dense clustering of the cell bodies of neurons, leading to a characteristic grayish appearance to the naked eye or when seen on standard T1 magnetic resonance imaging (MRI) scans. WM comprises the axons and their surrounding myelin insulation. The axon is a protoplasmic projection from the cell body that allows rapid transduction of an electrochemical signal, known as an action potential, across longer distances of the nervous system. In humans, axons are insulated by a fatty white-appearing covering called myelin. The layer of myelin is produced by the attachment of glial cells to the axon (oligodendrocytes in the CNS and Schwann cells in the peripheral nervous system, PNS). The myelin sheath covering is discontinuous and the gaps between the myelin sheath on axon are known as nodes of Ranvier. These gaps allow exchange of ions with the extracellular space which helps regeneration of action potential across the axon. The myelin covering enables faster conduction

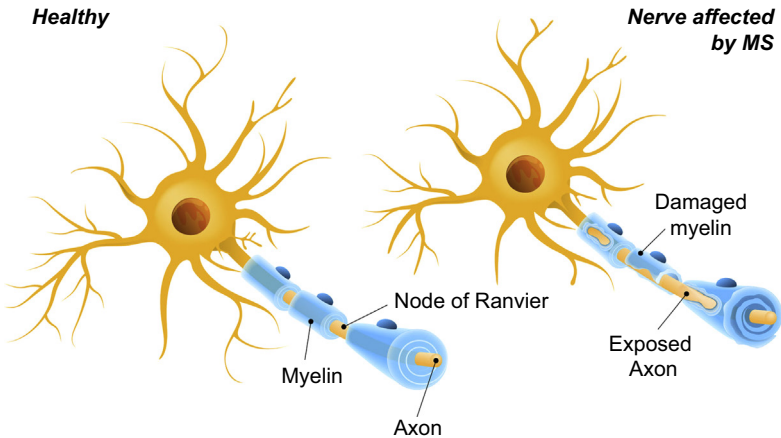


FIGURE 3.1 A graphical representation of the anatomical structure of a neuron and comparison between a healthy neuron and a neuron affected by multiple sclerosis (MS). As shown in the figure, the myelin sheath surrounding the axon is damaged in MS. Reprinted with permission from www.123rf.com; designua © 123RF.com.

of the action potential across neurons by permitting the neural impulse to propagate rapidly from node to node. In brief, the pathology of MS involves damage to the myelin sheath, which results in disturbances in conduction of nerve impulses, which in turn affects motor, sensory, visual, and autonomic systems.¹¹ These disturbances may manifest in several ways. First, lesions (or plaques) to the WM, brain stem, basal ganglia, optic nerve, and spinal cord are among the most commonly observed.¹² These lesions are a result of demyelination and subsequent attempts of remyelination, which builds up plaques along the damaged axons eventually.¹² MS also is associated with the loss of oligodendrocytes, which are responsible for the production of myelin in the CNS.¹² Second, MS can lead to a disruption of the blood–brain barrier, which allows T cells to enter the CNS and initiate a cascade of other immune responses, which in turn commences inflammation.¹² There are four clinical subtypes of MS⁸: (1) relapsing remitting (RR) type—which is the most common pattern and involves periods of flair-ups followed by periods of relative dormancy; (2) secondary progressive (SP) type—which involves a slow worsening of symptoms over time, often with a relapsing and remitting progression; (3) primary progressive (PP) type—which involves a slow but fairly consistent worsening of symptoms over time, without a clear relapse/remission pattern; and (4) progressive relapsing type—which involves a progressive worsening of symptoms with acute periods of exacerbations without clear remissions.

NEUROIMAGING IN MS

MS is a challenging disease when it comes to diagnosis and treatment. Over the past decade, the development of new imaging modalities such as MRI has

revolutionized the management of this disease, particularly with regard to diagnosis and monitoring disease progression. In this chapter, we briefly outline the use of standard clinical MRI scans for diagnosis and monitoring, and introduce the investigational use of newer cutting edge neuroimaging technologies, such as diffusion tensor imaging (DTI) and fiber tractography, which hold the promise of rapidly advancing understanding of this debilitating disease.

MRI is a widely used imaging modality that provides excellent resolution of the lesions common to MS. Standard MRI scans work on basic principles of quantum mechanics. In brief, during a typical MRI scan, the body part of interest is placed within a strong magnetic field, which aligns a large number of the hydrogen protons in the direction of the magnetic field. By applying a radio frequency (RF) pulse to the body part, the orientation of the protons can be momentarily reoriented. After cessation of the RF pulse, the realignment of the protons with the magnetic field will lead to a change in magnetic flux which can be captured by the receiver coil in the scanner and used to reconstruct three-dimensional images of the body part. Depending on the pulse sequences and imaging parameters used, the MRI can produce various sequences such as T1-weighted (T1WI), T1 contrast-enhanced (T1C), T2-weighted (T2WI), fluid-attenuated inversion recovery (FLAIR), DTI, and magnetic resonance spectroscopy (MRS), each providing meaningful information about the health and structure of the tissues and structures being imaged. Fig. 3.2 shows examples of T2WI scans showing MS lesions. MRI scans can be used clinically to make a diagnosis of MS. The McDonald criteria,¹³ currently considered the most reliable method of MS diagnosis, rely upon MRI to demonstrate the dissemination of lesions in time and space. Table 3.1 represents the most recent (2011) version of these criteria for using T2WI MRI images to diagnose MS.¹⁸ In the next

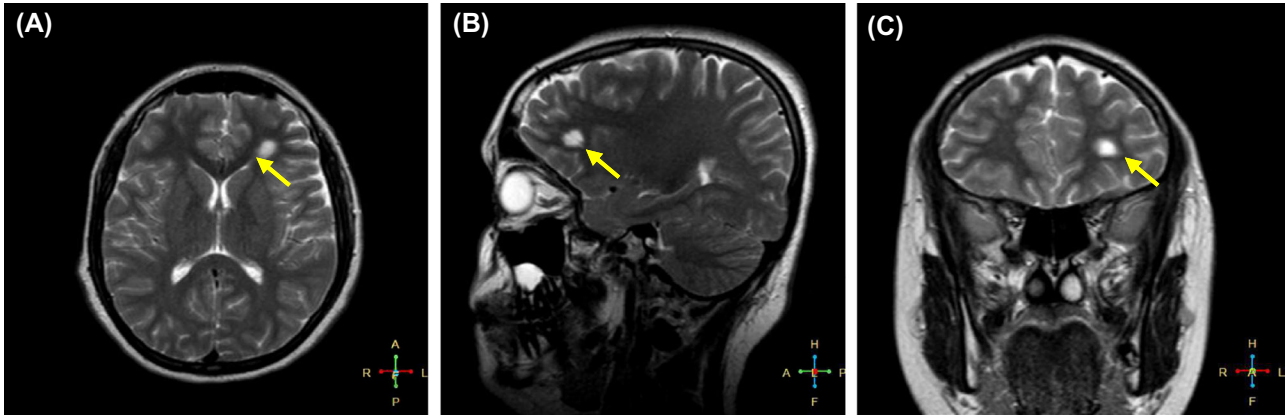


FIGURE 3.2 T2 weighted structural scans showing an oval shaped hyperintense lesion in the left forceps minor region on (A) axial view, (B) sagittal view, and (C) coronal view. Reprinted with permission from www.radiopaedia.org; image courtesy of Dr. Ahmed Abd Rabou.

TABLE 3.1 Revised McDonald Criteria¹⁸

Dissemination in Space	Dissemination in Time
<p>≥1 T2 lesions in two or more of the following locations:</p> <ul style="list-style-type: none">• Periventricular• Juxtacortical• Infratentorial• Spinal cord• If a patient has a brain stem/spinal cord syndrome, the symptomatic lesion(s) are excluded from the criteria, not contributing to the lesion count	<ul style="list-style-type: none">• A new lesion on follow-up MRI-T2 lesion and/or gadolinium enhancing or• Presence of asymptomatic gadolinium-enhancing lesion and a nonenhancing T2 lesion on any one scan

[AU5]

few paragraphs, we outline some of the major findings on each type of MRI scan in patients with MS.

T1-Weighted Imaging

While T1WI provide exquisite detail of the brain and show clear demarcation between GW and WM, they are not as sensitive as T2WI for detecting MS. In general, T1WI findings vary on the basis of duration and severity of the disease. Axonal loss or destruction in early stages of disease can appear as hypointense or isointense ovoid, rounded or linear shaped lesions, appearing as dark spots on the scan. These are usually seen along the calloseseptal interface or periventricular area and are referred to as T1 *black holes*. Sometimes, as the disease progresses the black holes may be marked by a peripheral rim of hyperintensity due to macrophage infiltration and lipid peroxidation of the surrounding tissues. This gives the lesions a *beveled* or a *lesion-within-lesion appearance*. In advanced stages of disease, thinning of corpus callosum (CC) with or without generalized brain atrophy can be seen on T1WI.

T1-Weighted Contrast Imaging

Adding a contrast agent to an MRI scan can help in identifying certain lesions or pathologies. In the case of

MS, gadolinium contrast can be used with a T1 sequence to highlight the actively demyelinating lesions. The lesions can appear punctate, nodular, or rim shaped contrast-enhancing lesions in the cerebral WM. An incomplete rim with the open nonenhancing end facing toward the cortex resembling a horseshoe is a characteristic finding of MS seen on this sequence. The “horse shoe sign” represents active stage of disease. Treatment with steroids drastically suppresses the enhancement and appearance of these lesions.

T2-Weighted Imaging and FLAIR

The T2 sequence, especially FLAIR, is considered to be the most sensitive MRI scan for detecting MS plaques. These images are helpful for identifying lesions because they suppress the appearance of cerebrospinal fluid, which allows for greater resolution in detecting lesions in the periventricular regions. Multiple hyperintense lesions, sometimes surrounded by hypointense peripheral rim with perilesional edema, can be seen. The lesions can be ovoid (as shown in Fig. 3.2), linear, circular, or triangular in shape. A triangular shaped lesion with the base of triangle adjacent to the lateral ventricle and apex pointing toward the cortex is one of the typical findings of MS. Perivenular collection of inflammatory cells along medullary veins can be seen as hyperintensities

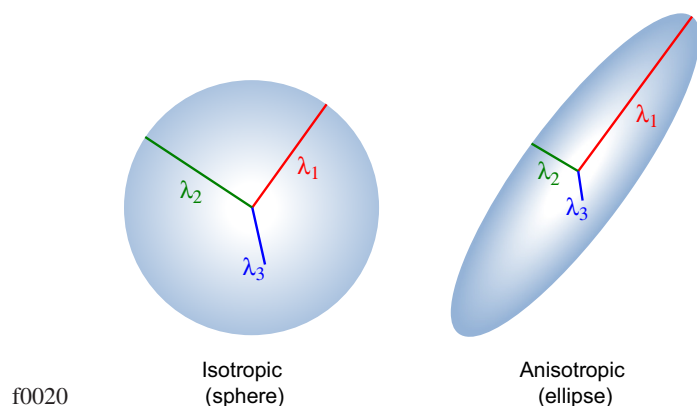


FIGURE 3.3 Illustrative example of prototypical water diffusion. Isotropic diffusion means that water molecules can diffuse equally in all directions, as illustrated by a spherical pattern. Anisotropic diffusion means that water molecules are constrained and diffuse more readily in one direction (λ_1) than in the other two directions (λ_2 and λ_3).

perpendicular to the lateral ventricles on axial and sagittal views. This finding is referred to as *Dawson fingers*. The calloseseptal interface may show alternate areas of hyperintensity and hypointensity on FLAIR sagittal view giving a dot-dash appearance. This is known as the *dot-dash sign* and is one of the earliest characteristic finding of MS.

Magnetic Resonance Spectroscopic Imaging

Proton MRS is one of the unique applications of the MRI technique. It yields the information about the chemical composition of different metabolites in the tissues rather than information about anatomical structure or function. Biochemical changes are common within a tissue that is affected by certain disease states. These changes are then compared with the normal distribution of the chemicals to assess the degree and extent of damage within that tissue. While the range of neurochemicals that can be assessed with MRS is limited, there are some that may be particularly important in the case of MS. In particular, N-acetyl aspartate (NAA) is an extremely abundant chemical in the brain, particularly within myelin, so it could be an indicator of WM damage in MS. In fact, evidence reported in 2014 supports the suggestion that in primary and SP type of MS the MRS shows decreased levels of NAA, suggesting a biomarker of axonal damage.²⁷ Other neurochemicals have been found to be elevated in acute lesions of MS, including the levels of myoinositol, choline, and glutamate.²⁵

Diffusion Tensor Imaging

DTI is a relatively new neuroimaging technique that has been used to study WM alterations in a great variety of conditions, ranging from depression, to traumatic

brain injury, to MS. DTI measures the movement of water molecules within the living tissue,² permitting inference regarding the underlying structure of the tissues and their membranes. The motion of water molecules can be described in geometric terms as either resembling a sphere or an elongated ellipsoid and is characterized as being either isotropic or anisotropic in nature, respectively. Isotropic movement occurs when water molecules are unconstrained and free to move in any direction equally, and would thus be best defined as a spherical diffusion pattern. On the other hand, water moving in a tube or garden hose would move preferentially in one direction much more than in other directions, and would therefore be better characterized as anisotropic (i.e., an ellipsoid) pattern of diffusion.² For instance, due to the lack of axons within the brain ventricles that would have restricted the movement otherwise, the water is free to move in any direction and hence the movement within these structures would be described as being isotropic. In the brain WM, on the other hand, the presence of axons restricts the movement of water molecules in a particular direction and therefore movement within WM regions is predominantly anisotropic in nature.

Axons are not always perfectly aligned along one axis and in order to avoid having to measure diffusion along an impractically large number of axes, a concept of diffusion ellipsoid has been developed.¹⁵ The diffusion ellipsoid is defined using three eigenvectors that have three corresponding eigenvalues (λ_1 , λ_2 , and λ_3) that describe their physical length.¹⁶ The longest, medium, and shortest eigenvectors are represented by λ_1 , λ_2 , and λ_3 , respectively.¹⁶ Fig. 3.3 shows the relationships between these three eigenvectors for isotropic and anisotropic shapes.

A number of diffusion measurements have been developed in an attempt to characterize diffusion patterns within the brain WM. Fractional anisotropy (FA) is a global diffusivity measure that measures the degree of anisotropy and is used to evaluate WM integrity. FA is defined by the following formula¹⁵:

$$FA = \frac{\sqrt{\frac{1}{2} \left[(\lambda_1 - \lambda_2)^2 + (\lambda_2 - \lambda_3)^2 + (\lambda_3 - \lambda_1)^2 \right]}}{\sqrt{\lambda_1^2 + \lambda_2^2 + \lambda_3^2}}$$

FA values range from 0 to 1, with higher values indicating higher anisotropy (i.e., water diffuses more along one axis relative to the others). Mean diffusivity (MD) has also frequently been used to measure the overall diffusivity and represents the average of the three eigenvalues²⁹:

$$MD = \frac{(\lambda_1 + \lambda_2 + \lambda_3)}{3}$$

Two other DTI metrics that have been proposed to further explain changes in the global measures (i.e., FA

and MD) are radial diffusivity (RD) and axonal diffusivity (AD). RD is used to measure diffusion across the axon whereas AD describes movement of water molecules along the axon. Changes within these metrics have been attributed to demyelination and axonal damage, respectively. In their pioneering studies, Song and colleagues showed that loss of myelin following retinal ischemia in mouse optic nerve was associated with increased RD and unchanged axial diffusivity.^{22–24} Moreover, they showed that axonal degeneration observed during histological analysis was concurrently associated with reduced AD and unaltered RD.²² Therefore, these metrics have been used to describe potential reasons for changes within the global diffusivity measures. RD is defined in the following way²³:

$$\lambda_{\perp} = \frac{(\lambda_2 + \lambda_3)}{2}$$

p0110 AD is represented by $\lambda_{\parallel} = \lambda_1$ ²³.

s0045 DTI Findings in MS

p0115 Using conventional MRI, earlier studies were able to demonstrate macrostructural damage, such as WM lesions, that underlie the physical and cognitive disturbances that are commonly observed in MS. With application of DTI to a wider range of illnesses including MS, both physicians and scientists were able to better understand this condition on a microstructural level. One of the earliest studies by Werring, Clark, Barker, Thompson, and Miller²⁸ showed reduced FA and high MD in normal-appearing white matter (NAWM) in frontal, parietal, temporal, and occipital regions. Based on the earlier description, this suggests that MS is associated with regions of greater spherically shaped diffusion, potentially suggesting poorer axonal integrity or disruption of myelin (see Fig. 3.4B and C). An important implication from these findings is the notion that WM changes may start occurring before clinical symptoms emerge and remain undetectable using conventional MRI and hence potentially delay clinical interventions that could affect the onset of the illness or reduce its severity.

p0120 More recent studies have rectified this earlier limitation by investigating individual WM fiber bundles with the advent of WM tractography (Fig. 3.4A), an outgrowth of DTI procedures. This technique allows a more accurate identification and description of WM architecture. As shown in Fig. 3.4, it is possible to use the FA values at individual locations throughout the brain to determine the probable fiber pathways representing large bundles of axons and plot them for visual representation. Fink et al.⁵ have investigated coherence within a number of WM regions including the uncinate fasciculus (UF), superior longitudinal fasciculus, fornix, and cingulum in a group of MS patients. The left UF showed reduced

FA and increased MD while the right UF was characterized by increased RD. Increase in RD has been frequently interpreted to signal demyelination.²² In addition, there was a bilateral reduction in FA within the fornix. Similar to the UF findings, increased RD was observed in the left cingulum.

Similarly, Hecke et al.⁷ used voxel-based morphometry that implements whole-brain approach to studying brain WM to examine WM microstructure in RR and SP MS. They have demonstrated reduced FA in a number of WM tracts including the inferior longitudinal fasciculus (ILF), capsula interna, and forceps major in MS patients. There were also changes in AD that were consistent with the FA findings such that lower AD was observed in the ILF and capsula interna, as well as in the body of the CC and corona radiata (CR). Increased MD and RD were observed in the ILF, the capsula interna and externa, genu, body, and splenium of the CC, forceps major, and CR. These findings therefore indicate that MS is characterized by both axonal damage and demyelination, although the precise location of the damage varies by tract. p0125

Kern, Sarcona, Montag, Giesser, and Sicotte⁹ studied the relationship between WM integrity and motor function in RR MS using whole-brain DTI analysis as well as probabilistic tractography. This study observed 7.1% decrease in FA in the CC, CR, cingulum, and internal capsule, with concurrent 24.95% increase in RD within these regions, thus suggesting demyelination. Other regions with reduced RD included the cortico-spinal tract, right cerebellar peduncle, right external capsule, and left cerebellum. These changes in WM metrics were related to performance of motor tasks. In particular, reduced FA and increased RD in the body of the CC and mid-posterior CR was associated with reduced right-hand performance on the nine-hole peg test (NHPT). Increased RD in cortical WM adjacent to the left motor and right frontal cortices also predicted poor right-hand performance on the NHPT. Furthermore, worse left-hand performance was related to the reduced FA in the body of the CC and a region of occipital WM. These results suggest that at least motor dysfunction observed in MS is differentially affected by WM compromise due to asymmetry. Finally, increased RD at baseline predicted decrease in performance on the NHPT⁹. p0130

In 2015, Asaf, Evan, and Anat¹ studied a large sample of RR MS participants using whole-brain analysis approach in order to examine temporal timeframe of WM degeneration. This study included participants with MS at different stages of the disease duration: less than 1 year (short duration), 1 year (medium duration) and over 1 year (up to 6 years; long duration). Compared to medium disease duration, long disease duration was characterized by diffuse reduction in FA, especially in the body of the CC, by 22%. In the short disease duration p0135

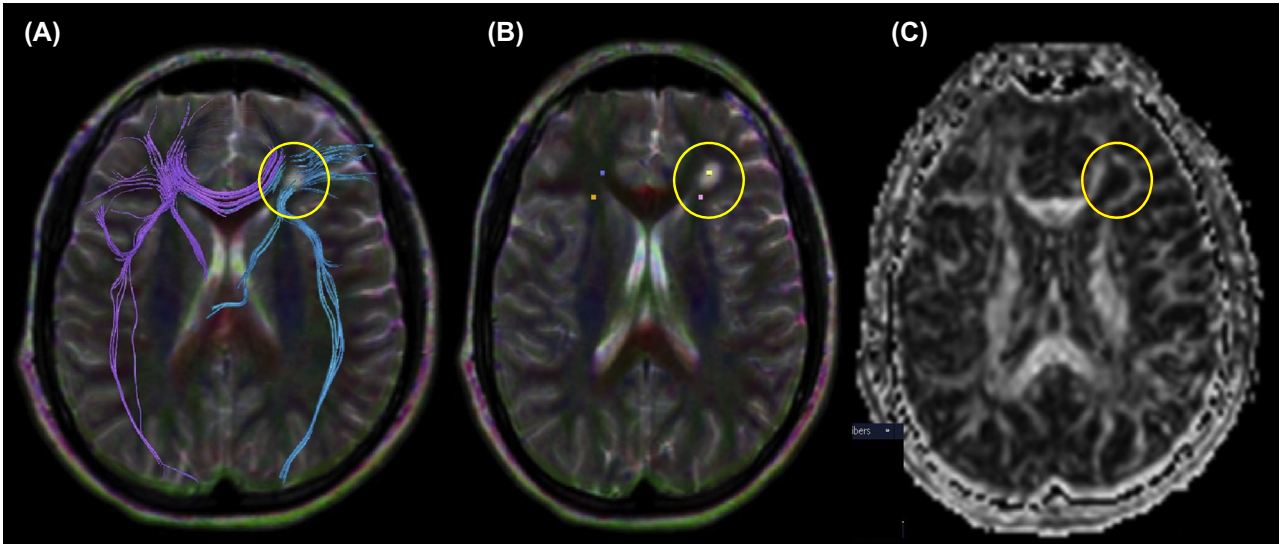


FIGURE 3.4 DTI findings for a plaque located in the left forceps minor region. (A) A tractographic image revealing destruction of white matter fibers at the site of plaque (circled). (B) A combination of anatomical color map with T2WI image with ROI markings at the site of plaque (circled) and normal appearing white matter. The circled ROI at the site of plaque shows decreased FA and increase ADC indicating increased diffusion of water molecules. (C) The FA map. White matter fibers appear bright except at the site of the plaque which appears dark as the diffusion becomes isotropic (circled). Reprinted with permission from www.radiopaedia.org; image courtesy of Dr. Ahmed Abd Rabou.

group, FA was reduced by 31% compared to healthy controls, especially in the ILF. There was no difference between the short disease duration and medium disease duration. Overall, disease duration negatively correlated with FA. This study provides evidence for a time-dependent WM atrophy that affects different tracts to a variable degree.

Similarly, Sigal, Shmuel, Mark, Gil, and Anat²¹ showed an association between disease duration and changes in diffusivity measures. Specifically, this study observed a positive correlation between disease duration and rate of relapse and average diffusivity coefficient (ADC). Moreover, lower FA and increased AD and RD were observed in the MS group compared to healthy controls in the whole CC but not within its subregions. These findings further suggest that WM degeneration is temporally contingent. Taken together, these observations led researchers to explore the association between this trend and corresponding cognitive deterioration.

Relationship Between DTI Measures and Cognitive Profile of MS

Following the initial investigations into the WM changes in MS, researchers became interested in examining the effects that these neural changes have on the cognitive profile associated with this condition. Koenig et al.¹⁰ used probabilistic tractography to investigate the relationship between the WM and cognitive function in RR and SP MS. This study observed reduced FA and increased RD, AD, and MD in the posterior cingulate bundle in the MS group compared to controls. The

findings also indicated that episodic memory, as measured by the Brief Visuospatial Memory Test-R (BVM-T), was a significant predictor of RD in the posterior cingulate bundle. Moreover, speed of processing, as measured by the Symbol Digit Modalities Test (SDMT), was a strong predictor of RD in the posterior limb of the internal capsule and posterior cingulate bundle. Taken together, these findings indicate that MS is associated with WM abnormalities within tracts that have traditionally been implicated in emotion, attention, and memory. These alterations were, in turn, manifested by memory and attention problems.

Memory problems are frequently observed in MS and have therefore been studied in relation to WM microstructure. Hecke et al.⁷ studied working memory in a group of RR MS patients using whole-brain voxel-based morphometry. They observed reduction in FA in the group of MS patients compared to healthy controls in a number of major WM tracts, including the ILF, capsula interna, and forceps major and concurrently reduced AD in the ILF, capsula interna, body of CC, and CR. Additionally, there was an increase in RD and MD in the ILF, capsula interna and externa, genu, body, and splenium of the CC, forceps major, and CR. These diffusion measures were also shown to be related to performance on working memory tasks, such as Paced Auditory Serial Addition Test (PASAT). In particular, there was a significant positive correlation between PASAT and FA in the left ILF, forceps minor, the capsula interna and externa, genu of the CC, left cingulum, superior longitudinal fasciculus (SLF), and CR. This pattern of results was also observed in a study by Syc et al.²⁶ who used continuous

tractography method to study the microstructure of the cingulum and fornix. This study observed 19% reduction in FA in a group of RR, SP, and PP MS in the fornix, with a concurrent increase in RD, AD, and MD. There was also an increase in RD, AD, and MD within the left and right cingulum, with no significant changes within FA. In the left cingulum, there was a significant association between the diffusivity measures and performance on the PASAT of information processing and attention, where lower scores on the test were associated with lower FA and higher MD and RD.

p0155 Contrary to Syc et al.,²⁶ using the same tractography method, Ozturk et al.¹⁷ studied microarchitecture of the subregions of the CC in relation to performance on the PASAT in a sample of RR, SP, and PP MS patients. The findings of that study showed reduced FA and increased RD and MD in the whole CC in MS compared to healthy controls. When subregions of the CC were studied individually, a positive correlation was observed between FA and the body and splenium of the CC. This finding not only suggests the involvement of multiple tracts in performance of PASAT but is also indicative of heterogeneous changes within different portions of the CC in this condition. Caligiuri et al.³ have examined the role of the callosal subregions in cognitive function in MS. They observed an association between FA in the genu and splenium of the CC and cognitive function where cognitive impairment was significantly related to reduction in FA. Since the study by Caligiuri et al.³ used a compound score to measure cognitive function, it cannot be directly compared to the results of the study by Ozturk et al.¹⁷ who observed change in different subregions of the CC in relation to performance on the PASAT.

p0160 Another test that is frequently used to assess cognitive difficulties observed in MS is California Verbal Learning Test (CVLT), a task specifically designed to assess short- and long-term verbal memory. Performance on this assessment has recently been studied in conjunction with WM damage observed in MS. Using tractography, Fink et al.⁵ studied microarchitecture of the UF, SLF, cingulum, and fornix and observed that RD within the UF predicted performance on the encoding subscale of the CVLT. Moreover, this study also showed a significant positive correlation between the recognition subscale of the CVLT and PD in the right fornix. These results indicate that in this clinical population, different aspects of verbal memory are differently affected depending on the specificity of WM damage as assessed by DTI techniques.

s0055 Relationship Between DTI Measures and Psychiatric Profile of MS

p0165 Apart from the cognitive complaints, emotional problems have also been observed in patients with MS.

In particular, depression is one of the most frequently reported psychiatric sequelae. The lifetime prevalence of depression in MS is estimated to be 25–50%.¹⁴ Pujol, Bello, Deus, Marti-Vilalta, and Capdevila¹⁹ studied structural alterations in the frontal and temporal regions in depressed MS patients. Their results showed an association between lesions in the arcuate fasciculus and greater depressive symptoms. These lesions predicted approximately 17% of variance in depressive scores. Feinstein et al.⁴ studied NAWM in MS patients. Their results showed greater reduction in FA in the left anterior NAWM in the depressed MS compared to nondepressed MS. Additionally, increased MD was observed in the right inferior frontal lobe.

In a DTI study reported in 2014, Gobbi et al.⁶ performed a whole-brain analysis looking at both PP and SP forms of MS. They observed reduced FA in the forceps minor in the depressed subgroup compared to the nondepressed participants. This finding is of a particular significance given that this region of the CC connects parts of the dorso-medial prefrontal cortex (DMPFC) and has been implicated in the pathogenesis of depression.⁶ Pujol et al.¹⁹ studied the microstructure of the arcuate fasciculus in patients with MS and showed that lesions within this tract were associated with cognitive expression of mood in these patients. After controlling for cognitive deficits, lesions in the arcuate fasciculus predicted 26% of variance in the Beck Depression Inventory (BDI) scores.¹⁹ Shen et al.²⁰ used whole-brain analysis to examine the association between WM architecture and the Hamilton Rating Scale for Depression (HAM-D). This study has showed a positive association between the scores on HAM-D and FA in a number of WM regions including the right precentral gyrus, cingulate gyrus, and posterior cingulate. This is inconsistent with past research showing decreased WM integrity with increased depressive symptoms. This finding may be attributable to the compensatory mechanisms that have been previously observed.

CONCLUSIONS

s0060

MS is a progressive and debilitating disease that affects the myelin sheath of axonal pathways. Traditional clinical imaging, particularly T2-weighted MRI, has revolutionized the ability of researchers and clinicians to diagnose and track disease progression. These types of MRI scans provide clear evidence of the characteristic lesions of MS. Nonetheless, advances in MRI technology, particularly DTI and fiber tractography are providing even greater resolution and understanding of how MS affects specific fiber tracts and may allow an even more precise monitoring of disease progression. While these

newer DTI methods are still primarily investigational, they hold great promise for furthering understanding of MS and its underlying pathology.

s0065 References

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WATSON: 03

Non-Print Items

Abstract

[AU3]

Multiple sclerosis (MS) is a chronic debilitating disorder affecting the central nervous system (CNS), particularly the white matter. Over the years, there have been significant advances made in the management of MS including diagnosis and treatment. Magnetic resonance imaging (MRI) is one of the neuroimaging modalities which has revolutionized the diagnosis and early detection of the disease. MRI has also proven useful to monitor disease progression in patients with MS and estimate its prognosis. In this chapter we have described the neuroimaging findings in MS using various methods of MRI. On the basis of sequence and imaging parameters applied, MRI scans can provide T1-weighted, T2-weighted, fluid-attenuated inversion recovery (FLAIR), diffusion tensor imaging (DTI), and proton magnetic resonance spectroscopy (MRS) images, all of which may have applicability in the evaluation of patients with MS. Some of these sequences, especially DTI and MRS, have proven particularly helpful in understanding the pathology of this disease from a new perspective. We focus extensively on the recent development and application of DTI and fiber tractography in understanding and characterizing the white matter lesions that occur in MS. The application of these methods holds considerable promise for advancing our understanding of MS.

Keywords: Autoimmune; Demyelination; Diffusion tensor imaging (DTI); Diffusion weighted imaging (DWI); Fluid-attenuated inversion recovery (FLAIR); Fractional anisotropy (FA); Magnetic resonance imaging (MRI); Multiple sclerosis; Neuroimaging; Neuron; Tractography.

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2004-2016	Reviewer, NeuroImage
2004-2006	Reviewer, Neuropsychologia
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2012	Reviewer, BMC Neuroscience
2012-2015	Reviewer, Cognition and Emotion
2012	Reviewer, Journal of Behavioral Decision Making
2012	Reviewer, Psychosomatic Medicine
2012-2014	Reviewer, PLoS One
2012	Reviewer, American Journal of Critical Care
2012-2014	Reviewer, Journal of Sleep Disorders: Treatment and Care
2013	Reviewer, Experimental Psychology
2013	Reviewer, Clinical Interventions in Aging
2013	Reviewer, Frontiers in Psychology
2013	Reviewer, Brain Structure and Function
2013	Reviewer, Appetite
2013-2016	Reviewer, JAMA Psychiatry
2014	Reviewer, Acta Psychologica
2014	Reviewer, Neurology
2014	Reviewer, Applied Neuropsychology: Child
2014-2016	Reviewer, Journal of Applied Psychology
2015	Reviewer, Early Childhood Research Quarterly
2015	Reviewer, Behavioral Neuroscience
2015	Reviewer, Scientific Reports
2016	Reviewer, Neuroscience & Biobehavioral Reviews
2016	Reviewer, Psychological Science
2016	Reviewer, Medicine & Science in Sports and Exercise
2016	Reviewer, Archives of Clinical Neuropsychology

PUBLICATIONS/CREATIVE ACTIVITY

Refereed Journal Articles

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2. **Killgore WD.** Empirically derived factor indices for the Beck Depression Inventory. Psychol Rep. 84(3 Pt 1):1005-13, 1999.
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5. **Killgore WD, Gangestad SW.** Sex differences in asymmetrically perceiving the intensity of facial expressions. Percept Mot Skills. 89(1):311-4, 1999.

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127. Olson, EA, Weber, M, Rauch, SL, & **Killgore, WD**. Daytime sleepiness is associated with reduced integration of temporally distant outcomes on the Iowa Gambling Task. *Behavioral Sleep Medicine*, 14, 200-211, 2016.
128. **Killgore, WD**, Sonis, LA, Rosso, IM, & Rauch, SL. Emotional intelligence partially mediates the association between anxiety sensitivity and anxiety symptoms. *Psychological Reports*, 118, 23-40, 2016.
129. Freed, MC, Novak, LA, **Killgore, WD**, Rauch, S, Koehlmoos, TP, Ginsberg, JP, Krupnick, J, Rizzo, AS, Andrews, A, & Engle, CC. IRB and research regulatory delays within the military healthcare setting: Do they really matter? And if so, why and for whom? *American Journal of Bioethics*, 16, 30-37, 2016.
130. Alkozei, A, Smith, R, Pisner, D, Vanuk, JR, Markowski, SM, Fridman, A, Shane, BR, Knight, SA, & **Killgore, WD**. Exposure to blue light increases later functional activation of the prefrontal cortex during working memory. *SLEEP*, 3, 1671-1680, 2016.
131. Smith, R, Alkozei, A, Lane, RD, & **Killgore, WD**. Unwanted reminders: The effects of emotional memory suppression on subsequent neuro-cognitive processing. *Consciousness and Cognition*, 44, 103-113, 2016.
132. Smith, R, Alkozei, A, & **Killgore, WD**. Contributions of self-report and performance-based individual differences measures of social cognitive ability on large-scale network functioning. *Brain Imaging and Behavior* (in press).
133. Pisner, DA, Smith, R, Alkozei, A, Klimova, A, & **Killgore, WD**. Highways of the emotional intellect: White matter microstructural correlates of an ability-based measure of emotional intelligence. *Social Neuroscience* (in press).
134. Kelly, MR, **Killgore, WD**, Haynes, PL. Understanding recent insights in sleep and posttraumatic stress disorder from a research domain criteria (RDoC) framework. *Current Sleep Medicine Reports* (in press).

Book Chapters/Editorials

1. **Killgore, WD**. Cortical and limbic activation during visual perception of food. In Dube, L, Bechara, A, Dagher, A, Drewnowski, A, Lebel, J, James, P, & Yada, R. (Eds), *Obesity Prevention: The Role of Brain and Society on Individual Behavior*. Elsevier, Boston, 2010, pp. 57-71.

2. **Killgore, WD.** Asleep at the trigger: Warfighter judgment and decision-making during prolonged wakefulness. In Bartone, P. (Ed), *Applying Research Psychology to Improve Performance and Policy*. 2010, pp. 59-77.
3. **Killgore, WD.** Effects of Sleep Deprivation on Cognition. In Kerkhof, G. & Van Dongen, H. *Progress in Brain Research: Sleep and Cognition*. Elsevier, B.V. New York, 2010, pp. 105-129.
4. **Killgore, WD.** Caffeine and other alerting agents. In Thorpy, M. & Billiard, M. (Eds), *Sleepiness: Causes, Consequences, Disorders and Treatment*. Cambridge University Press, UK, 2011, pp. 430-443.
5. **Killgore WD.** Priorities and challenges for caffeine research: Energy drinks, PTSD, and withdrawal reversal. *The Experts Speak Column, J Caffeine Res*, 1, 11-12, 2011.
6. **Killgore, WD.** Odor identification ability predicts executive function deficits following sleep deprivation. In Lee-Chiong, T (Ed), *Best of Sleep Medicine 2011*. National Jewish Health, Denver CO, 2011, pp. 31-33.
7. **Killgore, WD.** Socio-emotional and neurocognitive effects of sleep loss. In Matthews, G. (Ed), *Handbook of Operator Fatigue*. Ashgate, London UK, 2012, pp. 227-243.
8. **Killgore, WD.** Sleepless nights and bulging waistlines (Editorial). *Journal of Sleep Disorders: Treatment and Care*, 1(1), doi: [10.4172/jsdtc.1000e101](https://doi.org/10.4172/jsdtc.1000e101), 2012.
9. **Killgore, WD, & Penetar, DM.** Sleep and Military Operational Effectiveness. In Kushida, CA (Ed), *The Encyclopedia of Sleep*, 2013, vol. 1, pp. 311-319. Academic Press, Waltham, MA.
10. **Killgore, WD, Weiner, MR, & Schwab, ZJ.** Sleep deprivation, personality, and psychopathic changes. In Kushida, CA (Ed), *The Encyclopedia of Sleep*, 2013, vol. 1, pp. 264-271. Academic Press, Waltham, MA.
11. Schoenberg, MR, & **Killgore, WD.** Psychologic and Psychiatric Assessment. In Kushida, CA (Ed), *The Encyclopedia of Sleep*, 2013, vol. 2, pp. 23-26. Academic Press, Waltham, MA.
12. **Killgore, WD.** Sleep loss and performance. In Moore, BA, & Barnett, JE (Eds), *Military Psychologists' Desk Reference*, 2013, pp. 241-246. Oxford University Press, New York.
13. Weber, M., & **Killgore, WD.** What are the emerging therapeutic uses of bright light therapy for neurological disorders? (Editorial). *Future Neurology*, 8, 495-497, 2013.
14. **Killgore WD & Weber, M.** Sleep deprivation and cognitive performance. In Bianchi, M (Ed), *Sleep Deprivation and Disease: Effects on the Body, Brain and Behavior*, 2014, pp. 209-229. Springer, New York.
15. **Killgore, WD.** Sleep deprivation and behavioral risk taking. In Watson, RR, *Sleep Modulation by Obesity, Diabetes, Age and Diet*, 2015, pp. 279-287. Elsevier, San Diego, CA.

16. **Killgore, WD.** Lighting the way to better sleep and health (Editorial). *Journal of Sleep Disorders: Treatment and Care*, 5:1.
17. Klimova, A, Singh, P, & **Killgore WD.** White matter abnormalities in MS: Advances in diffusion tensor imaging/tractography. In Watson, RR & Killgore, WD (Eds), *Nutrition and Lifestyle in Neurological Autoimmune Diseases* (in press).
18. Singh, P, & **Killgore WD.** Time dependent differences in gray matter volume post mild traumatic brain injury. *Neural Regeneration Research*, 11, 920-921, 2016.

Published U.S. Government Technical Reports

1. **Killgore, WD,** Estrada, A, Rouse, T, Wildzunas, RM, Balkin, TJ. Sleep and performance measures in soldiers undergoing military relevant training. USAARL Report No. 2009-13. June, 2009.
2. Kelley, AM, **Killgore, WD,** Athy, JR, Dretsch, M. Risk propensity, risk perception, and sensation seeking in U.S. Army Soldiers: A preliminary study of a risk assessment battery. USAARL Report No. 2010-02. DTIC #: ADA511524. October, 2009.

WORKS IN PROGRESS

1. **Killgore, WD,** Olson, EA, Weber, M, Rauch, SL, & Nickerson, LD. Emotional intelligence is associated with synchronized resting state activity between emotion regulation and interoceptive experience networks. *NeuroImage* (submitted).
2. Smith, R, **Killgore, WD,** & Lane, RD. A reconceptualization of emotional intelligence based on neural systems. *Behavioral and Brain Sciences* (submitted).
3. Alkozei, A, & **Killgore, WD.** Gratitude and wellbeing: A review and proposed model. *Journal of Happiness Studies* (submitted).
4. **Killgore, WD.** Individual differences in rested activation of the ventral striatum predicts overeating during sleep deprivation. (in preparation).
5. **Killgore, WD,** Tkachenko, O, Rauch, SL, & Nickerson, LD. Multimodal neuroimaging at rested baseline predicts resistance to overnight sleep deprivation. (in preparation).
6. Chaumet, G, **Killgore WD,** & Rabat, A. Performance self-estimation and decision-making: an new task (GoPT) for exploring aspects of risk taking. (in preparation).
7. Pisner, DA, Smith, R, Alkozei, A, Klimova, A, & **Killgore, WD.** White matter microstructural correlates of an ability measure of emotional intelligence. (in preparation).
8. Sneider, JT, Jensen, JE, Silveri, MM, & **Killgore, WD.** Prefrontal GABA predicts resistance to

sleep deprivation. (in preparation).

9. Weber, M, **Killgore WD**, and Rauch, SL. Regionally specific alterations in network organization following psychological trauma and post-traumatic stress disorder. (in preparation).
10. Weber, M, & **Killgore, WD**. Functional brain network organization in relation to self-reported habitual sleep. (in preparation).
11. Weber, M, & **Killgore WD**. Sleep disturbance following traumatic brain injury—a critical review. (in preparation).
12. **Killgore, WD**. Neural correlates of healthy food and activity decisions. (in preparation).

CONFERENCES/SCHOLARLY PRESENTATIONS

Colloquia

- | | |
|------|---|
| 2000 | <i>The Neurobiology of Emotion in Children</i> , McLean Hospital, Belmont, MA [<i>Invited Lecture</i>] |
| 2001 | <i>The Neurobiology of Emotion in Children and Adolescents</i> , McLean Hospital, Belmont, MA [<i>Invited Lecture</i>] |
| 2002 | Cortico-Limbic Activation in Adolescence and Adulthood, Youth Advocacy Project, Cape Cod, MA [<i>Invited Lecture</i>] |
| 2008 | Lecture on <i>Sleep Deprivation, Executive Function, and Resilience to Sleep Loss</i> ; 105 th IMA Detachment, U.S. Army Reserve Center, Boston, MA [<i>Invited Lecture</i>] |
| 2008 | Lecture on <i>The Role of Research Psychology in the Army</i> ; 105 th IMA Detachment, U.S. Army Reserve Center, Boston, MA [<i>Invited Lecture</i>] |
| 2008 | Lecture on <i>Combat Stress Control: Basic Battlemind Training</i> ; 105 th IMA Detachment, U.S. Army Reserve Center, Boston, MA [<i>Invited Lecture</i>] |
| 2009 | Lecture entitled <i>Evaluate a Casualty, Prevent Shock, and Prevent Cold Weather injuries</i> ; 105 th IMA Detachment, U.S. Army Reserve Center, Boston, MA [<i>Invited Lecture</i>] |
| 2009 | Lecture on <i>Combat Exposure and Sleep Deprivation Effects on Risky Decision-Making</i> ; 105 th IMA Detachment, U.S. Army Reserve Center, Boston, MA [<i>Invited Lecture</i>] |
| 2009 | Lecture on the <i>Sleep History and Readiness Predictor (SHARP)</i> ; 105 th IMA Detachment, U.S. Army Reserve Center, Boston, MA [<i>Invited Lecture</i>] |
| 2009 | Lecture on <i>The Use of Actigraphy for Measuring Sleep in Combat and Military Training</i> ; 105 th IMA Detachment, U.S. Army Reserve Center, Boston, MA [<i>Invited Lecture</i>] |

- 2010 Lecture entitled *Casualty Evaluation*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2010 Lecture entitled *Combat Stress and Risk-Taking Behavior Following Deployment*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2010 Lecture entitled *Historical Perspectives on Combat Medicine at the Battle of Gettysburg*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2010 Lecture entitled *Sleep Loss, Stimulants, and Decision-Making*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2010 Lecture entitled *PTSD: New Insights from Brain Imaging*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2011 Lecture entitled *Effects of bright light therapy on sleep, cognition and brain function after mild traumatic brain injury*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2011 Lecture entitled *Laboratory Sciences and Research Psychology in the Army*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2011 Lecture entitled *Tools for Assessing Sleep in Military Settings*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2011 Lecture entitled *The Brain Basis of Emotional Trauma and Practical Issues in Supporting Victims of Trauma*, U.S. Department of Justice, United States Attorneys Office, Serving Victims of Crime Training Program, Holyoke, MA [*Invited Lecture*]
- 2011 Lecture entitled *The Brain Altering Effects of Traumatic Experiences*; 105th Reinforcement Training Unit (RTU), U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2012 Lecture entitled *Sleep Loss, Caffeine, and Military Performance*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2012 Lecture entitled *Using Light Therapy to Treat Sleep Disturbance Following Concussion*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2013 Lecture entitled *Brain Responses to Food: What you See Could Make you Fat*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2013 Lecture entitled *Predicting Resilience Against Sleep Loss*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2014 Lecture entitled *Get Some Shut-Eye or Get Fat: Sleep Loss Affects Brain Responses to Food*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]

- 2014 Lecture entitled *Emotional Intelligence: Developing a Training Program*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2014 Lecture entitled *Supporting Cognitive and Emotional Health in Warfighters*. Presented to the Senior Vice President for the Senior Vice President for Health Sciences and Dean of the Medical School, University of Arizona, Tucson, AZ [*Invited Lecture*]
- 2015 Lecture entitled *Understanding the Effects of Mild TBI (Concussion) on the Brain*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2015 Presentation entitled *Superhuman Brains: The Neurocircuitry that Underlies the Ability to Resist Sleep Deprivation*. Presented at the Neuroscience Datablitz, University of Arizona, Tucson, AZ [*Invited Lecture*]
- 2015 Presentation entitled: *SCAN Lab Traumatic Stress Study*. Presented at the Tucson Veteran Center, Tucson AZ [*Invited Lecture*]
- 2016 Presentation entitled: *SCAN Lab Overview*. Presented at the University of Arizona 2016 Sleep workshop, Tucson, AZ [*Invited Lecture*]
- 2016 Lecture entitled *Trauma Exposure and the Brain*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]
- 2016 Presentation entitled *Supporting Cognitive and Emotional Health in Warfighters*. UAHS Development Team, University of Arizona Health Sciences Center, Tucson, AZ [*Invited Lecture*]
- 2016 Lecture entitled *Novel Approaches for Reducing Depression in the Military*; 105th IMA Detachment, U.S. Army Reserve Center, Boston, MA [*Invited Lecture*]

Seminars

- 2001 *Using Functional MRI to Study the Developing Brain*, Judge Baker Children's Center, Harvard Medical School, Boston, MA [*Invited Lecture*]
- 2002 Lecture on the *Changes in the Lateralized Structure and Function of the Brain during Adolescent Development*, Walter Reed Army Institute of Research, Washington, DC [*Invited Lecture*]
- 2005 Lecture on *Functional Neuroimaging, Cognitive Assessment, and the Enhancement of Soldier Performance*, Walter Reed Army Institute of Research, Washington, DC [*Invited Lecture*]
- 2005 Lecture on *The Sleep History and Readiness Predictor*: Presented to the Medical Research and Materiel Command, Ft. Detrick, MD [*Invited Lecture*]

- 2006 Lecture on *Optimization of Judgment and Decision Making Capacities in Soldiers Following Sleep Deprivation*, Brain Imaging Center, McLean Hospital, Belmont MA [Invited Lecture]
- 2006 Briefing to the Chairman of the Cognitive Performance Assessment Program Area Steering Committee, U.S. Army Military Operational Medicine Research Program, entitled *Optimization of Judgment and Decision Making Capacities in Soldiers Following Sleep Deprivation*, Walter Reed Army Institute of Research [Invited Lecture]
- 2010 Lecture on *Patterns of Cortico-Limbic Activation Across Anxiety Disorders*, Center for Anxiety, Depression, and Stress, McLean Hospital, Belmont, MA [Invited Lecture]
- 2010 Lecture on *Cortico-Limbic Activation Among Anxiety Disorders*, Neuroimaging Center, McLean Hospital, Belmont, MA [Invited Lecture]
- 2011 Lecture on *Shared and Differential Patterns of Cortico-Limbic Activation Across Anxiety Disorders*, McLean Research Day Brief Communications, McLean Hospital, Belmont, MA [Invited Lecture]
- 2014 Lecture entitled *Supporting Cognitive and Emotional Health in Warfighters*. Presented to the Senior Vice President for Health Sciences and Dean of the Medical School, University of Arizona, Tucson, AZ [Invited Lecture]
- 2015 Lecture entitled *Sleep Loss and Brain Responses to Food*. Presented for the Sleep Medicine Lecture Series, University of Arizona Medical Center, Tucson, AZ [Invited Lecture]
- 2015 Presentation entitled *Superhuman Brains: The Neurocircuitry that Underlies the Ability to Resist Sleep Deprivation*. Presented at the Neuroscience Datablitz, University of Arizona, Tucson, AZ [Invited Lecture]
- 2015 Lecture entitled *Sleep Deprivation Selectively Impairs Emotional Aspects of Cognition*. Presented at the Pamela Turbeville Speaker Series, McClelland Institute for Children, Youth, and Families, Tucson, AZ, [Invited Lecture]
- 2005 Briefing to the Chairman of the National Research Council (NRC) Committee on Strategies to Protect the Health of Deployed U.S. Forces, John H. Moxley III, on the *Optimization of Judgment and Decision Making Capacities in Soldiers Following Sleep Deprivation*, Walter Reed Army Institute of Research, Washington, DC [Invited Lecture]
- 2006 Lecture on *Norming a Battery of Tasks to Measure the Cognitive Effects of Operationally Relevant Stressors*, Cognitive Performance Assessment Program Area Steering Committee, U.S. Army Military Operational Medicine Research Program, Washington, DC [Invited Lecture]
- 2007 Lecture on *Cerebral Responses During Visual Processing of Food*, U.S. Army Institute of Environmental Medicine, Natick, MA [Invited Lecture]

- 2007 Briefing on the *Measurement of Sleep-Wake Cycles and Cognitive Performance in Combat Aviators*, U.S. Department of Defense, Defense Advanced Research Projects Agency (DARPA), Washington, DC [*Invited Lecture*]
- 2007 Lecture on *The Effects of Fatigue and Pharmacological Countermeasures on Judgment and Decision-Making*, U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL [*Invited Lecture*]
- 2008 Lecture on the *Validation of Actigraphy and the SHARP as Methods of Measuring Sleep and Performance in Soldiers*, U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL [*Seminar*]
- 2009 Lecture on Sleep Deprivation, *Executive Function, and Resilience to Sleep Loss*: Walter Reed Army Institute of Research AIBS Review, Washington DC [*Invited Lecture*]
- 2009 Lecture Entitled *Influences of Combat Exposure and Sleep Deprivation on Risky Decision-Making*, Evans U.S. Army Hospital, Fort Carson, CO [*Invited Lecture*]
- 2009 Lecture on *Making Bad Choices: The Effects of Combat Exposure and Sleep Deprivation on Risky Decision-Making*, 4th Army, Division West, Quarterly Safety Briefing to the Commanding General and Staff, Fort Carson, CO [*Invited Lecture*]
- 2011 Lecture Entitled *The effects of emotional intelligence on judgment and decision making*, *Military Operational Medicine Research Program Task Area C*, R & A Briefing, Walter Reed Army Institute of Research, Silver Spring, MD [*Invited Lecture*]
- 2011 Lecture Entitled *Effects of bright light therapy on sleep, cognition, brain function, and neurochemistry following mild traumatic brain injury*, *Military Operational Medicine Research Program Task Area C*, R & A Briefing, Walter Reed Army Institute of Research, Silver Spring, MD [*Invited Lecture*]
- 2012 Briefing to GEN (Ret) George Casey Jr., former Chief of Staff of the U.S. Army, entitled *Research for the Soldier*. McLean Hospital, Belmont, MA. [*Invited Lecture*]
- 2012 Lecture Entitled *Effects of bright light therapy on sleep, cognition, brain function, and neurochemistry following mild traumatic brain injury*, *Military Operational Medicine Research Program In Progress Review (IPR) Briefing*, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]
- 2013 Lecture Entitled *Update on the Effects of Bright light therapy on sleep, cognition, brain function, and neurochemistry following mild traumatic brain injury*, *Military Operational Medicine Research Program In Progress Review (IPR) Briefing*, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]
- 2013 Lecture Entitled *Internet Based Cognitive Behavioral Therapy: Effects on Depressive Cognitions and Brain Function*, *Military Operational Medicine Research Program In Progress Review (IPR) Briefing*, U.S. Army Medical Research and Materiel Command,

Fort Detrick, MD [*Invited Lecture*]

- 2013 Seminar Entitled *Predicting Resilience Against Sleep Loss*, United States Military Academy at West Point, West Point, NY [*Invited Symposium*].
- 2014 Lecture entitled *Sleep Loss, Brain Function, and Cognitive Performance*, presented to the Psychiatric Genetics and Translational Research Seminar, Massachusetts General Hospital/Harvard Medical School, Boston, MA [*Invited Lecture*]
- 2014 Grand Rounds Lecture entitled *Sleep Loss, Brain Function, and Performance of the Emotional-Executive System*. University of Arizona Psychiatry Grand Rounds, Tucson, AZ [*Invited Lecture*]
- 2014 Psychology Department Colloquium entitled *Sleep Loss, Brain Function, and Performance of the Emotional-Executive System*. University of Arizona Department of Psychology, Tucson, AZ [*Invited Lecture*]
- 2014 Lecture Entitled *Internet Based Cognitive Behavioral Therapy: Effects on Depressive Cognitions and Brain Function*, Military Operational Medicine Research Program In Progress Review (IPR) Briefing, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]
- 2014 Lecture Entitled *The Neurobiological Basis and Potential Modification of Emotional Intelligence Through Affective/Behavioral Training*, Military Operational Medicine Research Program In Progress Review (IPR) Briefing, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]
- 2015 Lecture Entitled *Multimodal Neuroimaging to Predict Resistance to Sleep Deprivation*, presented at the Pulmonary Research Conference, Department of Medicine, Sleep Medicine Sleep Lecture Series, University of Arizona College of Medicine, Tucson, AZ [*Invited Lecture*].
- 2015 Lecture entitled *Sleep Deprivation Selectively Impairs Emotional Aspects of Cognition*. Presented at the Pamela Turbeville Speaker Series, McClelland Institute for Children, Youth, and Families, Tucson, AZ, [*Invited Lecture*]
- 2015 Lecture Entitled *Effects of bright light therapy on sleep, cognition, brain function, and neurochemistry following mild traumatic brain injury*, Military Operational Medicine Research Program In Progress Review (IPR) Briefing, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]
- 2015 Lecture Entitled *A Non-Pharmacologic Method for Enhancing Sleep in PTSD*, Military Operational Medicine Research Program In Progress Review (IPR) Briefing, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]
- 2015 Lecture Entitled *Internet Based Cognitive Behavioral Therapy: Effects on Depressive Cognitions and Brain Function*, Military Operational Medicine

Research Program In Progress Review (IPR) Briefing, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]

- 2015 Lecture Entitled *Operating Under the Influence: The Effects of Sleep Loss and Stimulants on Decision-Making and Performance*. Presented at the annual SAFER training for interns and residents, University of Arizona Department of Psychiatry, Tucson AZ [*Invited Lecture*]
- 2016 Lecture entitled *Translational Neuroimaging: Using MRI Techniques to Promote Recovery and Resilience*. Functional Neuroimaging Course, Spring 2016, Psychology Department, University of Arizona, Tucson, AZ [*Invited Lecture*]
- 2016 Lecture entitled *Supporting Cognitive and Emotional Health in Warfighters*. Presented at the Department of Behavioral Biology, Walter Reed Army Institute of Research, Silver Spring, MD [*Invited Lecture*]
- 2016 Lecture Entitled *Internet Based Cognitive Behavioral Therapy: Effects on Depressive Cognitions and Brain Function*, Military Operational Medicine Research Program In Progress Review (IPR) Briefing, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]
- 2016 Lecture Entitled *A Model for Predicting Cognitive and Emotional Health from Structural and Functional Neurocircuitry following TBI*, Military Operational Medicine Research Program In Progress Review (IPR) Briefing, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]
- 2016 Lecture Entitled *Refinement and Validation of a Military Emotional Intelligence Training Program*, Military Operational Medicine Research Program In Progress Review (IPR) Briefing, U.S. Army Medical Research and Materiel Command, Fort Detrick, MD [*Invited Lecture*]

Symposia/Conferences

- 1999 Oral Platform Presentation entitled *Functional MRI lateralization during memory encoding predicts seizure outcome following anterior temporal lobectomy*, 27th Annual Meeting of the International Neuropsychological Society, Boston, MA. [*Submitted Presentation*]
- 2000 Lecture on the *Neurobiology of Emotional Development in Children*, 9th Annual Parents as Teachers Born to Learn Conference, St. Louis, MO [*Invited Lecture*]
- 2001 Oral Platform Presentation entitled *Sex differences in functional activation of the amygdala during the perception of happy faces*, 29th Annual Meeting of the International Neuropsychological Society, Chicago, IL. [*Submitted Presentation*]
- 2002 Oral Platform Presentation entitled *Developmental changes in the lateralized activation of the prefrontal cortex and amygdala during the processing of facial affect*, 30th Annual Meeting of the International Neuropsychological Society, Toronto, Ontario, Canada.

[Submitted Presentation]

- 2002 Oral Platform Presentation *Gray and white matter volume during adolescence correlates with cognitive performance: A morphometric MRI study*, 30th Annual Meeting of the International Neuropsychological Society, Toronto, Ontario, Canada. *[Submitted Presentation]*
- 2004 Lecture on *Sleep Deprivation, Cognition, and Stimulant Countermeasures*: Seminar Presented at the Bi-Annual 71F Research Psychology Short Course, Ft. Detrick, MD, U.S. Army Medical Research and Materiel Command *[Invited Lecture]*
- 2004 Lecture on the *Regional Cerebral Blood Flow Correlates of Electroencephalographic Activity During Stage 2 and Slow Wave Sleep: An H215O PET Study*: Presented at the Bi-Annual 71F Research Psychology Short Course, Ft. Detrick, MD, U.S. Army Medical Research and Materiel Command *[Invited Lecture]*
- 2004 Oral Platform Presentation entitled *Regional cerebral metabolic correlates of electroencephalographic activity during stage-2 and slow-wave sleep: An H215O PET Study*, 18th Associated Professional Sleep Societies Annual Meeting, Philadelphia, PA. *[Submitted Presentation]*
- 2006 Lecture on *The Sleep History and Readiness Predictor*: Presented at the Bi-Annual 71F Research Psychology Short Course, Ft. Rucker, AL, U.S. Army Medical Research and Materiel Command *[Invited Lecture]*
- 2007 Symposium on *Cortical and Limbic Activation in Response to Visual Images of Low and High-Caloric Foods*, 6th Annual Meeting of the International Society for Behavioral Nutrition and Physical Activity (ISBNPA), Oslo, Norway *[Invited Lecture]*
- 2008 Lecture on *Sleep Deprivation, Executive Function, & Resilience to Sleep Loss*, First Franco-American Workshop on War Traumatism, IMN SSA, Toulon, France *[Invited Lecture]*
- 2009 Symposium Entitled *Sleep Deprivation, Judgment, and Decision-Making*, 23rd Annual Meeting of the Associated Professional Sleep Societies, Seattle, WA *[Invited Symposium]*
- 2009 Symposium Session Moderator for *Workshop on Components of Cognition and Fatigue: From Laboratory Experiments to Mathematical Modeling and Operational Applications*, Washington State University, Spokane, WA *[Invited Speaker]*
- 2009 Lecture on *Comparative Studies of Stimulant Action as Countermeasures for Higher Order Cognition and Executive Function Impairment that Results from Disrupted Sleep Patterns*, Presented at the NIDA-ODS Symposium entitled: Caffeine: Is the Next Problem Already Brewing, Rockville, MD *[Invited Lecture]*
- 2010 Oral Platform Presentation entitled *Sleep deprivation selectively impairs emotional aspects of cognitive functioning*, 27th Army Science Conference, Orlando, FL. *[Submitted Presentation]*

- 2010 Oral Platform Presentation entitled *Exaggerated amygdala responses to masked fearful faces are specific to PTSD versus simple phobia*, 27th Army Science Conference, Orlando, FL. [Submitted Presentation]
- 2012 Oral Symposium Presentation entitled *Shared and distinctive patterns of cortico-limbic activation across anxiety disorders*, 32nd Annual Conference of the Anxiety Disorders Association of America, Arlington, VA. [Invited Symposium]
- 2012 Oral Platform Presentation entitled *Shared and unique patterns of cortico-limbic activation across anxiety disorders*. 40th Meeting of the International Neuropsychological Society, Montreal, Canada. [Submitted Presentation]
- 2013 Lecture entitled *Brain responses to visual images of food: Could your eyes be the gateway to excess?* Presented to the NIH Nutrition Coordinating Committee and the Assistant Surgeon General of the United States, Bethesda, MD [Invited Lecture]
- 2014 Symposium Entitled *Operating Under the Influence: The Effects of Sleep Loss and Stimulants on Decision-Making and Performance*, Invited Faculty Presenter at the 34th Annual Cardiothoracic Surgery Symposium (CREF), San Diego, CA [Invited Symposium].
- 2014 Symposium Entitled *The Effects of Sleep Loss on Food Preference*, SLEEP 2014, Minneapolis, MN [Invited Symposium]
- 2015 Symposium Entitled *The Neurobiological Basis and Potential Modification of Emotional Intelligence in Military Personnel*. Invited presentation at the Yale Center for Emotional Intelligence, New Haven, CT [Invited Lecture]
- 2015 Lecture Entitled *Predicting Resilience to Sleep Loss with Multi-Modal Neuroimaging*. Invited presentation at the DARPA Sleep Workshop 2015, Arlington, VA [Invited Lecture]
- 2015 Symposium Entitled: *The Brain and Food: How your (sleepy) Eyes Might be the Gateway to Excess*, Invited Faculty Presenter at the 2015 University of Arizona Update on Psychiatry, Tucson, AZ [Invited Symposium].
- 2015 Oral Platform presentation entitled *Multimodal Neuroimaging to Predict Resistance to Sleep Deprivation*, Associated Professional Sleep Societies (APSS) SLEEP meeting, Seattle, WA [Submitted Presentation]
- 2015 Symposium Entitled presentation entitled *Sleep Deprivation and Emotional Decision Making*, Virginia Tech Sleep Workshop, Arlington, VA [Invited Symposium]
- 2016 Oral Platform presentation entitled *Default Mode Activation Predicts Vulnerability to Sleep Deprivation in the Domains of Mood, Sleepiness, and Vigilance*, Associated Professional Sleep Societies (APSS) SLEEP meeting, Denver, CO [Submitted Presentation]

2016 Oral Platform presentation entitled *Short Wavelength Light Therapy Facilitates Recovery from Mild Traumatic Brain Injury*, Military Health Systems Research Symposium (MHSRS), Orlando, FL [*Submitted Presentation*]

Peer Reviewed Published Abstracts

1. **Killgore, WD.** Development and validation of a new instrument for the measurement of transient mood states: The facial analogue mood scale (FAMS) [Abstract]. Dissertation Abstracts International: Section B: The Sciences & Engineering 1995; 56 (6-B): 3500.
2. **Killgore, WD, & Locke, B.** A nonverbal instrument for the measurement of transient mood states: The Facial Analogue Mood Scale (FAMS) [Abstract]. Proceedings of the Annual Conference of the Oklahoma Center for Neurosciences 1996, Oklahoma City, OK.
3. **Killgore, WD, Scott, JG, Oommen, KJ, & Jones, H.** Lateralization of seizure focus and performance on the MMPI-2 [Abstract]. Proceedings of the Annual Conference of the Oklahoma Center for Neurosciences 1996, Oklahoma City, OK.
4. **Killgore, WD, & Adams, RL.** Vocabulary ability and Boston Naming Test performance: Preliminary guidelines for interpretation [Abstract]. Archives of Clinical Neuropsychology 1997; 13(1).
5. **Killgore, WD, Glosser, G, Cooke, AN, Grossman, M, Maldjian, J, Judy, K, Baltuch, G, King, D, Alsop, D, & Detre, JA.** Functional activation during verbal memory encoding in patients with lateralized focal lesions [Abstract]. Epilepsia 1998; 39(Suppl. 6): 99.
6. **Killgore, WD.** A new method for assessing subtle cognitive deficits: The Clock Trail Making Test [Abstract]. Archives of Clinical Neuropsychology 1998; 14(1): 92.
7. **Killgore, WD, & DellaPietra, L.** Item response biases on the WMS-III Auditory Delayed Recognition Subtests [Abstract]. Archives of Clinical Neuropsychology 1998; 14(1): 92.
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37. **Killgore, WD,** Braun, AR, Belenky, G, Wesensten, NJ, & Balkin, TJ. Regional cerebral metabolic correlates of electroencephalographic activity during stage-2 and slow-wave sleep: An H215O PET Study [abstract]. Oral platform presentation at the 18th Associated Professional Sleep Societies Annual Meeting, Philadelphia, PA, June 5-10, 2004.
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45. Reichardt, RM, Grugle, NL, Balkin, TJ, & **Killgore, WD**. Stimulant countermeasures, risk propensity, and IQ across 2 nights of sleep deprivation [abstract]. Abstract presented at the Associated Professional Sleep Societies 19th Annual Meeting, Denver, CO, June 18-23, 2005. SLEEP, 28 (Supplement), A145.
46. Killgore, DB, McBride, SA, Balkin, TJ, & **Killgore, WD**. Post-stimulant hangover: The effects of caffeine, modafinil, and dextroamphetamine on sustained verbal fluency following sleep deprivation and recovery sleep [abstract]. Abstract presented at the Associated Professional Sleep Societies 19th Annual Meeting, Denver, CO, June 18-23, 2005. SLEEP, 28 (Supplement), A137.
47. **Killgore, WD**, Balkin, TJ, & Wesensten, NJ. Impaired decision-making following 49 hours of sleep deprivation [abstract]. Abstract presented at the Associated Professional Sleep Societies 19th Annual Meeting, Denver, CO, June 18-23, 2005. SLEEP, 28 (Supplement), A138.
48. **Killgore, WD**, McBride, SA, Killgore, DB, & Balkin, TJ. Stimulant countermeasures and risk propensity across 2 nights of sleep deprivation [abstract]. Abstract presented at the Associated Professional Sleep Societies 19th Annual Meeting, Denver, CO, June 18-23, 2005. SLEEP, 28 (Supplement), A136.
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50. Picchioni, D, **Killgore, WD**, Braun, AR, & Balkin, TJ. PET correlates of EEG activity during non-REM sleep. Poster presentation at the annual UCLA/Websciences Sleep Training Workshop, Lake Arrowhead, CA, September, 2005.
51. **Killgore, WD**, Killgore, DB, McBride, SA, & Balkin, TJ. Sustained verbal fluency following sleep deprivation and recovery sleep: The effects of caffeine, modafinil, and dextroamphetamine. Poster presented at the 34th Meeting of the International Neuropsychological Society, Boston, MA, February 1-4, 2006.
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Neuropsychological Society, Boston, MA, February 1-4, 2006.

53. **Killgore, WD,** & Yurgelun-Todd, DA. Neural correlates of emotional intelligence in adolescent children. Poster presented at the 34th Meeting of the International Neuropsychological Society, Boston, MA, February 1-4, 2006.
54. **Killgore, WD,** & Yurgelun-Todd, DA. Social anxiety predicts amygdala activation in adolescents viewing fearful faces. Poster presented at the 34th Meeting of the International Neuropsychological Society, Boston, MA, February 1-4, 2006.
55. McBride, SA & **Killgore, WD.** Sleepy people smell worse: Olfactory deficits following extended wakefulness. Paper presented at the Workshop on Trace Gas Detection Using Artificial, Biological, and Computational Olfaction. Monell Chemical Senses Center, Philadelphia, PA, March 29-31, 2006.
56. **Killgore, WD,** Day LM, Li, C, Kamimori, GH, Balkin, TJ, & Killgore DB. Moral reasoning is affected by sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A137.
57. **Killgore, WD,** Killgore DB, Kahn-Green, E, Conrad, A, Balkin, TJ, & Kamimori, G. H. Introversion-Extroversion predicts resilience to sleep loss [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A137.
58. Newman, R, Kamimori, GH, **Killgore, WD.** Sleep deprivation diminishes constructive thinking [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A136-137.
59. Huck, NO, Kendall, AP, McBride, SA, **Killgore, WD.** The perception of facial emotion is enhanced by psychostimulants following two nights of sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A136.
60. O'Sullivan, M, Reichardt, RM, Krugler, AL, Killgore, DB, & **Killgore, WD.** Premorbid intelligence correlates with duration and quality of recovery sleep following sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A372.
61. McBride, SA, **Killgore, WD,** Kahn-Green, E, Conrad, A, & Kamimori, GH. Caffeine administered to maintain overnight alertness does not disrupt performance during the daytime withdrawal period [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A136.
62. McBride, SA, Killgore DB, Balkin, TJ, Kamimori, GH, & **Killgore, WD.** Sleepy people smell worse: Olfactory decrements as a function of sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June

17-22, 2006. SLEEP, 29 (Supplement), A135.

63. Day, LM, Li, C, Killgore, DB, Kamimori, GH, & **Killgore, WD**. Emotional intelligence moderates the effect of sleep deprivation on moral reasoning [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A135.
64. Murray, CJ, Killgore, DB, Kamimori, GH, & **Killgore, WD**. Individual differences in stress management capacity predict responsiveness to caffeine during sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A43.
65. Murray, CJ, Newman, R, O'Sullivan, M, Killgore, DB, Balkin, TJ, & **Killgore, WD**. Caffeine, dextroamphetamine, and modafinil fail to restore Stroop performance during sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A370-371.
66. Richards, J, Killgore, DB, & **Killgore, WD**. The effect of 44 hours of sleep deprivation on mood using the Visual Analog Mood Scales [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A132.
67. Richards, J, & **Killgore, WD**. The effect of caffeine, dextroamphetamine, and modafinil on alertness and mood during sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A43.
68. Lipizzi, EL, Leavitt, BP, Killgore, DB, Kamimori, GH, & **Killgore, WD**. Decision making capabilities decline with increasing duration of wakefulness [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A131.
69. Lipizzi, EL, Killgore, DB, Kahn-Green, E, Kamimori, GH, & **Killgore, WD**. Emotional intelligence scores decline during sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A131.
70. Kahn-Green, E, Day, L, Conrad, A, Leavitt, BP, Killgore, DB, & **Killgore, WD**. Short-term vs. long-term planning abilities: Differential effects of stimulants on executive function in sleep deprived individuals [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A370.
71. Kahn-Green, E, Conrad, A, Killgore, DB, Kamimori, GH, & **Killgore, WD**. Tired and frustrated: Using a projective technique for assessing responses to stress during sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A130.

72. Killgore, DB, Kahn-Green, E, Balkin, TJ, Kamimori, GH, & **Killgore, WD**. 56 hours of wakefulness is associated with a sub-clinical increase in symptoms of psychopathology [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A130.
73. Killgore, DB, McBride, SA, Balkin, TJ, Leavitt, BP, & **Killgore, WD**. Modafinil improves humor appreciation during sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A42.
74. Reichardt, RM, Killgore, DB, Lipizzi, EL, Li, CJ, Krugler, AL, & **Killgore, WD**. The effects of stimulants on recovery sleep and post-recovery verbal performance following 61-hours of sleep deprivation [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A42.
75. Bailey, JD, Richards, J, & **Killgore, WD**. Prediction of mood fluctuations during sleep deprivation with the SAFTE Model [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A60.
76. Kendall, AP, McBride, S. A, & **Killgore, WD**. Visuospatial perception of line orientation is resistant to one night of sleep loss [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A369.
77. Kendall, AP, McBride, SA, Kamimori, GH, & **Killgore, WD**. The interaction of coping skills and stimulants on sustaining vigilance: Poor coping may keep you up at night [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A129.
78. Muckle, A, Killgore, DB, & **Killgore, WD**. Gender differences in the effects of stimulant medications on the ability to estimate unknown quantities when sleep deprived [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A369.
79. Krugler, AL, **Killgore, WD**, & Kamimori, G. H. Trait anger predicts resistance to sleep loss [abstract]. Abstract presented at the 20th Meeting of the Associated Professional Sleep Societies, Salt Lake City, UT, June 17-22, 2006. SLEEP, 29 (Supplement), A129.
80. **Killgore, WD**, Cotting, DI, Vo, A. H, Castro, CA, & Hoge, CW. The invincibility syndrome: Combat experiences predict risk-taking propensity following redeployment [abstract]. Abstract presented at the 9th Annual Force Health Protection Conference, Albuquerque, NM, August 6-11, 2006.
81. **Killgore, WD**, Wesensten, NJ, & Balkin, TJ. Stimulants improve tactical but not strategic planning during prolonged wakefulness [abstract]. Abstract presented at the 9th Annual Force Health Protection Conference, Albuquerque, NM, August 6-11, 2006.

82. **Killgore, WD**, Balkin, TJ, Wesensten, NJ, & Kamimori, G. H. The effects of sleep loss and caffeine on decision-making [abstract]. Abstract presented at the 9th Annual Force Health Protection Conference, Albuquerque, NM, August 6-11, 2006.
83. **Killgore, WD**, Balkin, TJ, & Kamimori, GH. Sleep loss can impair moral judgment [abstract]. Abstract presented at the 9th Annual Force Health Protection Conference, Albuquerque, NM, August 6-11, 2006.
84. **Killgore, WD**, Lipizzi, EL, Reichardt, RM, Kamimori, GH, & Balkin, TJ. Can stimulants reverse the effects of sleep deprivation on risky decision-making [abstract]? Abstract presented at the 25th Army Science Conference, Orlando, FL, November 27-30, 2006.
85. **Killgore, WD**, Killgore, DB, Kamimori, GH, & Balkin, TJ. Sleep deprivation impairs the emotional intelligence and moral judgment capacities of Soldiers [abstract]. Abstract presented at the 25th Army Science Conference, Orlando, FL, November 27-30, 2006.
86. **Killgore, WD**, Cotting, DI, Vo, AH, Castro, C.A, & Hoge, CW. The post-combat invincibility syndrome: Combat experiences increase risk-taking propensity following deployment [abstract]. Abstract presented at the 25th Army Science Conference, Orlando, FL, November 27-30, 2006.
87. Adam, GE, Szelenyi, ER, **Killgore, WD**, & Lieberman, HR. A double-blind study of two days of caloric deprivation: Effects on judgment and decision-making. Oral paper presentation at the Annual Scientific Meeting of the Aerospace Medical Association, New Orleans, LA, May, 2007.
88. Killgore, DB, Kahn-Greene, ET, Kamimori, GH, & **Killgore, WD**. The effects of acute caffeine withdrawal on short category test performance in sleep deprived individuals [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A43.
89. Richards, JM, Lipizzi, EL, Kamimori, GH, & **Killgore, WD**. Extroversion predicts change in attentional lapses during sleep deprivation [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A137.
90. Lipizzi, EL, Richards, JM, Balkin, TJ, Grugle, NL, & **Killgore, WD**. Morningness-Eveningness and Intelligence [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A345.
91. Lipizzi, EL, Richards, Balkin, TJ, Grugle, NL, & **Killgore WD**. Morningness-Eveningness affects risk-taking propensity during sleep deprivation [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A136.
92. McBride, SA, Ganesan, G, Kamimori, GH, & **Killgore, WD**. Odor identification ability predicts vulnerability to attentional lapses during 77 hours of sleep deprivation [abstract]. Abstract

presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A135.

93. Smith, KL, McBride, S. A, Kamimori, GH, & **Killgore, WD**. Individual differences in odor discrimination predict mood dysregulation following 56 hours of sleep deprivation [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A136.
94. McBride, SA, Leavitt, BP, Kamimori, GH, & **Killgore, WD**. Odor identification accuracy predicts resistance to sleep loss. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A137.
95. Killgore, DB, McBride, SA, Balkin, TJ, Grugle, NL. & **Killgore, WD**. Changes in odor discrimination predict executive function deficits following 45 hours of wakefulness [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A136.
96. Rupp, TL, Killgore, DB, Balkin, TJ, Grugle, NL, & **Killgore, WD**. The effects of modafinil, dextroamphetamine, and caffeine on verbal and nonverbal fluency in sleep deprived individuals [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A43.
97. Newman, RA, Krugler, AL, Kamimori, GH, & **Killgore, WD**. Changes in state and trait anger following 56 hours of sleep deprivation [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A138.
98. Rupp, TL, Grugle, NL, Krugler, AL, Balkin, TJ, & **Killgore, WD**. Caffeine, dextroamphetamine, and modafinil improve PVT performance after sleep deprivation and recovery sleep [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A44.
99. **Killgore, WD**, Lipizzi, EL, Balkin, TJ, Grugle, NL, & Killgore, DB. The effects of sleep deprivation and stimulants on self-reported sensation seeking propensity [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A42.
100. **Killgore, WD**, Richards, JM, Balkin, TJ, Grugle, NL, & Killgore DB. The effects of sleep deprivation and stimulants on risky behavior [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A41.
101. Newman, RA, Smith, KL, Balkin, TJ, Grugle, NL, & **Killgore, WD**. The effects of caffeine, dextroamphetamine, and modafinil on executive functioning following 45 hours of sleep deprivation [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A45.

102. Richards, JM, Lipizzi, EL, Balkin, TJ, Grugle, NL, & **Killgore, WD**. Objective alertness predicts mood changes during 44 hours of sleep deprivation [abstract]. Abstract presented at the 21st Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 9-14, 2007. SLEEP, 30 (Supplement), A56.
103. **Killgore, WD**, & Yurgelun-Todd, DA. Cortical and Limbic Activation in Response to Visual Images of Low and High-Caloric Food [abstract]. Oral symposium presented at the 6th Annual Conference of the Society of Behavioral Nutrition and Physical Activity (ISBNPA), Oslo, Norway, June 20-23, 2007. Proceedings of the ISBNPA, 2007, 75.
104. Estrada, A, **Killgore, WD**, Rouse, T, Balkin, TJ, & Wildzunas, RM. Total sleep time measured by actigraphy predicts academic performance during military training [abstract]. Abstract presented at the 22nd Meeting of the Associated Professional Sleep Societies, Baltimore, MD, June 7-12, 2008. SLEEP, 31 (Supplement), A134.
105. **Killgore, WD**, Lipizzi, EL, Smith, KL, Killgore, DB, Rupp, TL, Kamimori, GH, & Balkin, T. J. Nonverbal intelligence is inversely related to the ability to resist sleep loss [abstract]. Abstract presented at the 22nd Meeting of the Associated Professional Sleep Societies, Baltimore, MD, June 7-12, 2008. SLEEP, 31 (Supplement), A134.
106. **Killgore, WD**, Lipizzi, EL, Killgore, DB, Rupp, TL, Kamimori, GH, & Balkin, TJ. Emotional intelligence predicts declines in emotion-based decision-making following sleep deprivation [abstract]. Abstract presented at the 22nd Meeting of the Associated Professional Sleep Societies, Baltimore, MD, June 7-12, 2008. SLEEP, 31 (Supplement), A134.
107. Reid, CT, Smith, K, **Killgore, WD**, Rupp, TL, & Balkin, TJ. Higher intelligence is associated with less subjective sleepiness during sleep restriction [abstract]. Abstract presented at the 22nd Meeting of the Associated Professional Sleep Societies, Baltimore, MD, June 7-12, 2008. SLEEP, 31 (Supplement), A375.
108. Newman, R, **Killgore, WD**, Rupp, T. L, & Balkin, TJ. Better baseline olfactory discrimination is associated with worse PVT and MWT performance with sleep restriction and recovery [abstract]. Abstract presented at the 22nd Meeting of the Associated Professional Sleep Societies, Baltimore, MD, June 7-12, 2008. SLEEP, 31 (Supplement), A375.
109. Smith, KL, Reid, CT, **Killgore, WD**, Rupp, TL, & Balkin, TJ. Personality factors associated with performance and sleepiness during sleep restriction and recovery [abstract]. Abstract presented at the 22nd Meeting of the Associated Professional Sleep Societies, Baltimore, MD, June 7-12, 2008. SLEEP, 31 (Supplement), A376.
110. Lipizzi, EL, **Killgore, WD**, Rupp, TL, & Balkin, TJ. Risk-taking behavior is elevated during recovery from sleep restriction [abstract]. Abstract presented at the 22nd Meeting of the Associated Professional Sleep Societies, Baltimore, MD, June 7-12, 2008. SLEEP, 31 (Supplement), A376.
111. Lipizzi, EL, Rupp, TL, **Killgore, WD**, & Balkin, TJ. Sleep restriction increases risk-taking behavior [abstract]. Poster presented at the 11th Annual Force Health Protection Conference,

Albuquerque, NM, August, 9-15, 2008.

112. **Killgore, WD**, Estrada, A, Balkin, TJ, & Wildzunas, RM. Sleep duration during army training predicts course performance [abstract]. Poster presented at the 6th Annual Force Health Protection Conference, Albuquerque, NM, August, 11-17, 2008.
113. **Killgore, WD**, Lipizzi, EL, Smith, KL, Killgore, DB, Rupp, TL, Kamimori, GH, & Balkin, TJ. Higher cognitive ability is associated with reduced relative resistance to sleep loss [abstract]. Poster presented at the 6th Annual Force Health Protection Conference, Albuquerque, NM, August, 11-17, 2008.
114. **Killgore, WD**, Rupp, TL, Grugle, NL, Lipizzi, EL, & Balkin, TJ. Maintaining alertness during sustained operations: Which stimulant is most effective after 44 hours without sleep [abstract]? Poster presented at the 6th Annual Force Health Protection Conference, Albuquerque, NM, August, 11-17, 2008.
115. **Killgore, WD**, Newman, RA, Lipizzi, EL, Kamimori, GH, & Balkin, TJ. Sleep deprivation increases feelings of anger but reduces verbal and physical aggression in Soldiers [abstract]. Poster presented at the 6th Annual Force Health Protection Conference, Albuquerque, NM, August, 11-17, 2008.
116. Kelley, AM, Dretsch, M, **Killgore, WD**, & Athy, JR. Risky behaviors and attitudes about risk in Soldiers. Abstract presented at the 29th Annual Meeting of the Society for Judgment and Decision Making, Chicago, IL, November, 2008.
117. **Killgore, WD**, Ross, AJ, Silveri, MM, Gruber, SA, Kamiya, T, Kawada, Y, Renshaw, PF, & Yurgelun-Todd, DA. Citicoline affects appetite and cortico-limbic responses to images of high calorie foods. Abstract presented at the Society for Neuroscience, Washington DC, November 19, 2008.
118. Britton, JC, Stewart, SE, Price, LM, **Killgore, WD**, Gold, AL, Jenike, MA, & Rauch, SL. Reduced amygdalar activation in response to emotional faces in pediatric Obsessive-Compulsive Disorder. Abstract presented at the Annual meeting of the American College of Neuropsychopharmacology, Scottsdale, AZ, December 7-11, 2008.
119. **Killgore, WD**, Balkin, TJ, Estrada, A, & Wildzunas, RM. Sleep and performance measures in soldiers undergoing military relevant training. Abstract presented at the 26th Army Science Conference, Orlando, FL, December 1-4, 2008.
120. **Killgore, WD** & Yurgelun-Todd, DA. Cerebral correlates of amygdala responses during non-conscious perception of affective faces in adolescent children. Abstract presented at the 37th Annual Meeting of the International Neuropsychological Society, Atlanta, GA, February 11-14, 2009.
121. **Killgore, WD**, Killgore, DB, Grugle, NL, & Balkin, TJ. Odor identification ability predicts executive function deficits following sleep deprivation. Abstract presented the 37th Annual Meeting of the International Neuropsychological Society, Atlanta, GA, February 11-14, 2009.
122. **Killgore, WD**, Rupp, TL, Killgore, DB, Grugle, NL, and Balkin, TJ. Differential effects of

stimulant medications on verbal and nonverbal fluency during sleep deprivation. Abstract presented the 37th Annual Meeting of the International Neuropsychological Society, Atlanta, GA, February 11-14, 2009.

123. **Killgore, WD**, Killgore, DB, Kamimori, GH, & Balkin, TJ. When being smart is a liability: More intelligent individuals may be less resistant to sleep deprivation. Abstract presented the 37th Annual Meeting of the International Neuropsychological Society, Atlanta, GA, February 11-14, 2009.
124. **Killgore, WD**, Britton, JC, Price, LM, Gold, AL, Deckersbach, T, & Rauch, SL. Introversion is associated with greater amygdala and insula activation during viewing of masked affective stimuli. Abstract presented the 37th Annual Meeting of the International Neuropsychological Society, Atlanta, GA, February 11-14, 2009.
125. **Killgore, WD**, Britton, JC, Price, LM, Gold, AL, Deckersbach, T, & Rauch, SL. Amygdala responses of specific animal phobics do not differ from healthy controls during masked fearful face perception. Abstract presented the 37th Annual Meeting of the International Neuropsychological Society, Atlanta, GA, February 11-14, 2009.
126. **Killgore, WD**, Britton, JC, Price, LM, Gold, AL, Deckersbach, T, & Rauch, SL. Small animal phobics show sustained amygdala activation in response to masked happy facial expressions. Abstract presented the 37th Annual Meeting of the International Neuropsychological Society, Atlanta, GA, February 11-14, 2009. [**Merit Poster Award*]
127. Price, LM, **Killgore, WD**, Britton, JC, Kaufman, ML, Gold, AL, Deckersbach, T, & Rauch, SL. Anxiety sensitivity correlates with insula activation in response to masked fearful faces in specific animal phobics and healthy subjects. Abstract presented at the Annual Conference of the Anxiety Disorders Association of America, Santa Ana Pueblo, New Mexico, March 12-15, 2009.
128. **Killgore, WD**, Britton, JC, Price, LM, Gold, AL, Deckersbach, T, & Rauch, SL. Neuroticism is inversely correlated with amygdala and insula activation during masked presentations of affective stimuli. Abstract presented at the Annual Conference of the Anxiety Disorders Association of America, Santa Ana Pueblo, New Mexico, March 12-15, 2009.
129. **Killgore, WD**, Kelley, AM, & Balkin, TJ. Development and validation of a scale to measure the perception of invincibility. Abstract presented at the Annual Conference of the Anxiety Disorders Association of America, Santa Ana Pueblo, New Mexico, March 12-15, 2009.
130. Kelly, AM, **Killgore WD**, Athy, J, & Dretsch, M. Risk propensity, risk perception, risk aversion, and sensation seeking in U.S. Army soldiers. Abstract presented at the 80th Annual Scientific Meeting of the Aerospace Medical Association, Los Angeles, CA, May 3-7, 2009.
131. Britton, JC, Stewart, SE, Price, LM, **Killgore, WD**, Jenike, MA, & Rauch, SL. The neural correlates of negative priming in pediatric obsessive-compulsive disorder (OCD). Abstract presented at the 64th Annual Scientific Meeting of the Society of Biological Psychiatry, Vancouver, Canada, May 14-16, 2009.

132. **Killgore, WD**, Killgore, DB, Kamimori, GH, & Balkin, TJ. Caffeine protects against increased risk-taking behavior during severe sleep deprivation. Abstract presented at the 23rd Annual Meeting of the Associated Professional Sleep Societies, Seattle, Washington, June 7-12, 2009.
133. Killgore, DB, **Killgore, WD**, Grugle, NL, & Balkin, TJ. Executive functions predict the ability to sustain psychomotor vigilance during sleep loss. Abstract presented at the 23rd Annual Meeting of the Associated Professional Sleep Societies, Seattle, Washington, June 7-12, 2009.
134. **Killgore, WD**, & Yurgelun-Todd, DA. Trouble falling asleep is associated with reduced activation of dorsolateral prefrontal cortex during a simple attention task. Abstract presented at the 23rd Annual Meeting of the Associated Professional Sleep Societies, Seattle, Washington, June 7-12, 2009.
135. **Killgore, WD**, Kelley, AM, & Balkin, TJ. A new scale for measuring the perception of invincibility. Abstract presented at the 12th Annual Force Health Protection Conference, Albuquerque, New Mexico, August 14-21, 2009.
136. **Killgore, WD**, Killgore, DB, Grugle, NL, & Balkin, TJ. Executive functions contribute to the ability to resist sleep loss. Abstract presented at the 12th Annual Force Health Protection Conference, Albuquerque, New Mexico, August 14-21, 2009.
137. **Killgore, WD**, Killgore, DB, Kamimori, GH, & Balkin, TJ. Caffeine reduces risk-taking behavior during severe sleep deprivation. Abstract presented at the 12th Annual Force Health Protection Conference, Albuquerque, New Mexico, August 14-21, 2009. [**Best Paper: Research*]
138. **Killgore, WD**, Castro, CA, & Hoge, CW. Normative data for the Evaluation of Risks Scale—Bubble Sheet Version (EVAR-B) for large scale surveys of returning combat veterans. Abstract presented at the 12th Annual Force Health Protection Conference, Albuquerque, New Mexico, August 14-21, 2009.
139. **Killgore, WD**, Castro, CA, & Hoge, CW. Combat exposure and post-deployment risky behavior. Abstract presented at the 12th Annual Force Health Protection Conference, Albuquerque, New Mexico, August 14-21, 2009.
140. **Killgore, WD**, Price, LM, Britton, JC, Simon, N, Pollack, MH, Weiner, MR, Schwab, ZJ, Rosso, IM, & Rauch, SL. Paralimbic responses to masked emotional faces in PTSD: Disorder and valence specificity. Abstract presented at the Annual McLean Hospital Research Day, January 29, 2010.
141. **Killgore, WD**, Killgore, DB, Kamimori, GH, & Balkin, TJ. Caffeine minimizes behavioral risk-taking during 75 hours of sleep deprivation. Abstract presented at the 38th Annual Meeting of the International Neuropsychological Society, Acapulco, Mexico, February 3-6, 2010.
142. **Killgore, WD** & Balkin, TJ. Vulnerability to sleep loss is affected by baseline executive function capacity. Abstract presented at the 38th Annual Meeting of the International Neuropsychological Society, Acapulco, Mexico, February 3-6, 2010.

143. **Killgore, WD**, Smith, KL, Reichardt, RM., Killgore, DB, & Balkin, TJ. Intellectual capacity is related to REM sleep following sleep deprivation. Abstract presented at the 38th Annual Meeting of the International Neuropsychological Society, Acapulco, Mexico, February 3-6, 2010.
144. **Killgore, WD** & Yurgelun-Todd, DA. Cerebral correlates of amygdala responses to masked fear, anger, and happiness in adolescent and pre-adolescent children. Abstract presented at the 38th Annual Meeting of the International Neuropsychological Society, Acapulco, Mexico, February 3-6, 2010.
145. **Killgore, WD**, Post, A, & Yurgelun-Todd, DA. Sex differences in cortico-limbic responses to images of high calorie food. Abstract presented at the 38th Annual Meeting of the International Neuropsychological Society, Acapulco, Mexico, February 3-6, 2010.
146. **Killgore, WD** & Yurgelun-Todd, DA. Self-reported insomnia is associated with increased activation within the default-mode network during a simple attention task. Abstract presented at the 38th Annual Meeting of the International Neuropsychological Society, Acapulco, Mexico, February 3-6, 2010.
147. **Killgore, WD**, Price, LM, Britton, JC, Gold, AL, Deckersbach, T, & Rauch, SL. Neural correlates of anxiety sensitivity factors during presentation of masked fearful faces. Abstract presented at the 38th Annual Meeting of the International Neuropsychological Society, Acapulco, Mexico, February 3-6, 2010.
148. **Killgore, WD**, Grugle, NL, Conrad, TA, & Balkin, TJ. Baseline executive function abilities predict risky behavior following sleep deprivation. Abstract presented at the 24th Annual Meeting of the Associated Professional Sleep Societies, San Antonio, Texas, June 5-9, 2010.
149. **Killgore, WD**, Grugle, NL, & Balkin, TJ. Judgment of objective vigilance performance is affected by sleep deprivation and stimulants. Abstract presented at the 24th Annual Meeting of the Associated Professional Sleep Societies, San Antonio, Texas, June 5-9, 2010.
150. Killgore, DB, **Killgore, WD**, Grugle, NL, & Balkin, TJ. Resistance to sleep loss and its relationship to decision making during sleep deprivation. Abstract presented at the 24th Annual Meeting of the Associated Professional Sleep Societies, San Antonio, Texas, June 5-9, 2010.
151. Killgore DB, **Killgore, WD**, Grugle, NL, & Balkin, TJ. Subjective sleepiness and objective performance: Differential effects of stimulants during sleep deprivation. Abstract presented at the 24th Annual Meeting of the Associated Professional Sleep Societies, San Antonio, Texas, June 5-9, 2010.
152. Rupp, TL, **Killgore, WD**, & Balkin, TJ. Vulnerability to sleep deprivation is differentially mediated by social exposure in extraverts vs. introverts. Oral presentation at the "Data Blitz" section at the 24th Annual Meeting of the Associated Professional Sleep Societies, San Antonio, Texas, June 5-9, 2010.
153. Rupp, TL, **Killgore, WD**, & Balkin, TJ. Extraverts may be more vulnerable than introverts to

sleep deprivation on some measures of risk-taking and executive functioning. Abstract presented at the 24th Annual Meeting of the Associated Professional Sleep Societies, San Antonio, Texas, June 5-9, 2010.

154. Rupp, TL, **Killgore, WD**, & Balkin, TJ. Vulnerability to sleep deprivation is differentially mediated by social exposure in extraverts vs. introverts. Abstract presented at the 24th Annual Meeting of the Associated Professional Sleep Societies, San Antonio, Texas, June 5-9, 2010.
155. Capaldi, VF, Guerrero, ML, & **Killgore, WD**. Sleep disorders among OIF and OEF Soldiers. Abstract presented at the 24th Annual Meeting of the Associated Professional Sleep Societies, San Antonio, Texas, June 5-9, 2010.
156. **Killgore, WD**, Killgore, DB, Kamimori, GH, & Balkin, TJ. Caffeine reduces behavioral risk-taking during sleep deprivation. Abstract presented at the 65th Annual Meeting of the Society for Biological Psychiatry, New Orleans, Louisiana, May 20-22, 2010.
157. **Killgore, WD**, Price, LM, Britton, JC, Simon, N, Pollack, MH, Weiner, MR, Schwab, ZJ, Rosso, IM, & Rauch, SL. Paralimbic responses to masked emotional faces in PTSD: Disorder and valence specificity. Abstract presented at the 65th Annual Meeting of the Society for Biological Psychiatry, New Orleans, Louisiana, May 20-22, 2010.
158. Rosso, IM, Makris, N, Britton, JC, Price, LM, Gold, AL, Deckersbach, T, **Killgore, WD**, & Rauch SL. Anxiety sensitivity correlates with insular cortex volume and thickness in specific animal phobia. Abstract presented at the 65th Annual Meeting of the Society for Biological Psychiatry, New Orleans, Louisiana, May 20-22, 2010.
159. Rupp, TL, **Killgore, WD**, & Balkin, TJ. Vulnerability to sleep deprivation is mediated by social exposure in extraverts versus introverts. Oral platform presentation at the 20th Congress of the European Sleep Research Society, Lisbon, Portugal, September 14-18, 2010.
160. **Killgore, WD**, Estrada, A, & Balkin, TJ. A tool for monitoring soldier fatigue and predicting cognitive readiness: The Sleep History and Readiness Predictor (SHARP). Abstract presented at the 27th Army Science Conference, Orlando, FL, November 29-December 2, 2010.
161. **Killgore, WD**, Kamimori, GH, & Balkin, TJ. Caffeinated gum minimizes risk-taking in soldiers during prolonged sleep deprivation. Abstract presented at the 27th Army Science Conference, Orlando, FL, November 29-December 2, 2010.
162. **Killgore, WD**, Britton, JC, Schwab, ZJ, Weiner, MR, Rosso, IM, & Rauch, SL. Exaggerated amygdala responses to masked fearful faces are specific to PTSD versus simple phobia. Oral platform presentation at the 27th Army Science Conference, Orlando, FL, November 29-December 2, 2010. [***Winner Best Paper in Neuroscience!***]
163. **Killgore, WD**, Kamimori, GH, & Balkin, TJ. Sleep deprivation selectively impairs emotional aspects of cognitive functioning. Oral platform presentation at the 27th Army Science Conference, Orlando, FL, November 29-December 2, 2010.
164. Rupp, TL, **Killgore, WD**, & Balkin, TJ. Evaluation of personality and social exposure as

individual difference factors influencing response to sleep deprivation. Oral platform presentation at the 27th Army Science Conference, Orlando, FL, November 29-December 2, 2010.

165. **Killgore, WD**, Britton, JC, Rosso, IM, Schwab, ZJ, Weiner, MR, & Rauch, SL. Shared and differential patterns of amygdalo-cortical activation across anxiety disorders. Abstract presented at the 49th Annual Meeting of the American College of Neuropsychopharmacology, Miami Beach, FL, December 5-9, 2010.
166. Rosso, IM, **Killgore, WD**, Britton, JC, Weiner, MR, Schwab, ZJ, & Rauch, SL. Neural correlates of PTSD symptom dimensions during emotional processing: A functional magnetic resonance imaging study. Abstract presented at the 49th Annual Meeting of the American College of Neuropsychopharmacology, Miami Beach, FL, December 5-9, 2010.
167. **Killgore, WD**, Rosso, IM, Britton, JC, Schwab, ZJ, Weiner, MR, & Rauch, SL. Cortico-limbic activation differentiates among anxiety disorders with and without a generalized threat response. Abstract presented at the McLean Hospital Research Day, January 13, 2011.
168. Weiner, MR, Schwab, ZJ, Rauch, SL, & **Killgore WD**. Personality factors predict brain responses to images of high-calorie foods. Abstract presented at the McLean Hospital Research Day, January 13, 2011.
169. Schwab, ZJ, Weiner, MR, Rauch, SL, & **Killgore, WD**. Emotional and cognitive intelligence: Support for the neural efficiency hypothesis. Abstract presented at the McLean Hospital Research Day, January 13, 2011.
170. Crowley, DJ, Covell, MJ, **Killgore, WD**, Schwab, ZJ, Weiner, MR, Acharya, D, Rosso, IM, & Silveri, MM. Differential influence of facial expression on inhibitory capacity in adolescents versus adults. Abstract presented at the McLean Hospital Research Day, January 13, 2011.
171. **Killgore, WD**, Britton, JC, Rosso, IM, Schwab, ZJ, Weiner, MR, & Rauch, SL. Similarities and differences in cortico-limbic responses to masked affect probes across anxiety disorders. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
172. Rosso, IM, **Killgore, WD**, Britton, JC, Weiner, MR, Schwab, ZJ, & Rauch, SL. Hyperarousal and reexperiencing symptoms of post-traumatic stress disorder are differentially associated with limbic-prefrontal brain responses to threatening stimuli. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
173. Schwab, ZJ, Weiner, MR, Rauch, SL, & **Killgore, WD**. Neural correlates of cognitive and emotional intelligence in adults. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
174. Schwab, ZJ, Weiner, MR, Rauch, SL, & **Killgore, WD**. Cognitive and emotional intelligences: Are they distinct or related constructs? Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.

175. Schwab, ZJ, Weiner, MR, Rauch, SL, & **Killgore, WD**. Discrepancy scores between cognitive and emotional intelligence predict neural responses to affective stimuli. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
176. **Killgore, WD**, Schwab, ZJ, Weiner, MR, & Rauch, SL. Smart people go with their gut: Emotional intelligence correlates with non-conscious insular responses to facial trustworthiness. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
177. **Killgore, WD**, Weiner, MR, Schwab, ZJ, & Rauch, SL. Whom can you trust? Neural correlates of subliminal perception of facial trustworthiness. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
178. Weiner, MR, Schwab, ZJ, & Rauch, SL, **Killgore, WD**. Impulsiveness predicts responses of brain reward circuitry to high-calorie foods. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
179. Weiner, MR, Schwab, ZJ, & Rauch, SL, **Killgore, WD**. Conscientiousness predicts brain responses to images of high-calorie foods. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
180. Crowley, DJ, Covell, MJ, **Killgore, WD**, Schwab, ZJ, Weiner, MR, Acharya, D, Rosso, IM, & Silveri, MM. Differential influence of facial expression on inhibitory capacity in adolescents versus adults. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
181. Gruber, SA, Dahlgren, MK, **Killgore, WD**, Sagar, KA, & Racine, MT. Marijuana: Age of onset of use impacts executive function and brain activation. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
182. **Killgore, WD**, Conrad, TA, Grugle, NL, & Balkin, TJ. Baseline executive function abilities correlate with risky behavior following sleep deprivation. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
183. **Killgore, WD**, Grugle, NL, Killgore, DB, & Balkin, TJ. Resistance to sleep loss and decision making during sleep deprivation. Abstract presented at the 39th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 2-5, 2011.
184. **Killgore, WD**, Rosso, IM, Britton, JC, Schwab, ZJ, Weiner, MR, & Rauch, SL. Cortico-limbic activation differentiates among anxiety disorders with and without a generalized threat response. Abstract presented at the 66th Annual Meeting of the Society for Biological Psychiatry, San Francisco, CA, May 12-14, 2011. [**Blue Ribbon Finalist: Clinical/Translational*]
185. Schwab, ZJ, Weiner, MR, Rauch, SL, & **Killgore, WD**. Emotional and cognitive intelligence:

Support for the neural efficiency hypothesis. Abstract presented at the 66th Annual Meeting of the Society for Biological Psychiatry, San Francisco, CA, May 12-14, 2011.

186. Weiner, MR, Schwab, ZJ, Rauch, SL, & **Killgore WD**. Personality factors predict brain responses to images of high-calorie foods. Abstract presented at the 66th Annual Meeting of the Society for Biological Psychiatry, San Francisco, CA, May 12-14, 2011.
187. **Killgore, WD**, Grugle, NL, & Balkin, TJ. Sleep deprivation impairs recognition of specific emotions. Abstract presented at the 25th Annual Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 11-15, 2011.
188. **Killgore, WD**, & Balkin, TJ. Does vulnerability to sleep deprivation influence the effectiveness of stimulants on psychomotor vigilance? Abstract presented at the 25th Annual Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 11-15, 2011.
189. Killgore, DB, **Killgore, WD**, Grugle, NJ, & Balkin, TJ. Sleep deprivation impairs recognition of specific emotions. Abstract presented at the 25th Annual Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 11-15, 2011.
190. Weiner, MR, Schwab, ZJ, & **Killgore, WD**. Daytime sleepiness is associated with altered brain activation during visual perception of high-calorie foods: An fMRI study. Abstract presented at the 25th Annual Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 11-15, 2011.
191. Schwab, ZJ, Weiner, MR, & **Killgore, WD**. Functional MRI correlates of morningness-eveningness during visual presentation of high calorie foods. Abstract presented at the 25th Annual Meeting of the Associated Professional Sleep Societies, Minneapolis, MN, June 11-15, 2011.
192. **Killgore, WD**, Weiner, MR, & Schwab, ZJ. Daytime sleepiness affects prefrontal regulation of food intake. Abstract presented at the McLean Hospital Research Day, January 11, 2012.
193. Kipman, M, Schwab ZJ, Weiner, MR, DelDonno, S, Rauch SL, & **Killgore WD**. The insightful yet bitter comedian: The role of emotional versus cognitive intelligence in humor appreciation. Abstract presented at the McLean Hospital Research Day, January 11, 2012.
194. Weber, M, & **Killgore, WD**. Gray matter correlates of emotional intelligence. Abstract presented at the McLean Hospital Research Day, January 11, 2012.
195. Schwab, ZJ, & **Killgore, WD**. Sex differences in functional brain responses to food. Abstract presented at the McLean Hospital Research Day, January 11, 2012.
196. DelDonno, S, Schwab, ZJ, Kipman M, Rauch, SL, & **Killgore, WD**. The influence of cognitive and emotional intelligence on performance on the Iowa Gambling Task. Abstract presented at the McLean Hospital Research Day, January 11, 2012.
197. Song, CH, Kizielewicz, J, Schwab, ZJ, Weiner, MR, Rauch, SL, & **Killgore, WD**. Time is of the essence: The Design Organization Test as a valid, reliable, and brief measure of visuospatial

ability. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.

198. Kipman, M, Schwab, ZJ, DelDonno, S, & **Killgore, WD**. Gender differences in the contribution of cognitive and emotional intelligence to the left visual field bias for facial perception. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
199. Kipman, M., Schwab, ZJ, Weiner, MR, DelDonno, S, Rauch, SL, & **Killgore, WD**. Contributions of emotional versus cognitive intelligence in humor appreciation. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
200. Schwab, ZJ, & **Killgore, WD**. Disentangling emotional and cognitive intelligence. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
201. Schwab, ZJ, & **Killgore, WD**. Sex differences in functional brain responses to food. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
202. DelDonno, S, Schwab, ZJ, Kipman, M, Rauch, SL, & **Killgore, WD**. The influence of cognitive and emotional intelligence on performance on the Iowa Gambling Task. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
203. **Killgore, WD**, Britton, JC, Rosso, IM, Schwab, ZJ, Weiner, MR, & Rauch, SL. Shared and unique patterns of cortico-limbic activation across anxiety disorders. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
204. **Killgore, WD**, & Balkin, TJ. Sleep deprivation degrades recognition of specific emotions. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
205. **Killgore, WD**, & Schwab, ZJ. Emotional intelligence correlates with somatic marker circuitry responses to subliminal cues of facial trustworthiness. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
206. **Killgore, WD**, & Schwab, ZJ. Trust me! Neural correlates of the ability to identify facial trustworthiness. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
207. **Killgore, WD**, Schwab, ZJ, Weiner, MR, Kipman, M, DelDonno, S, & Rauch SL. Overeating is associated with altered cortico-limbic responses to images of high calorie foods. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.

208. **Killgore, WD**, Weiner, MR, & Schwab, ZJ. Daytime sleepiness affects prefrontal regulation of food intake. Abstract presented at the 40th Annual Meeting of the International Neuropsychological Society, Montreal, CA, February 15-18, 2012.
209. Weber, M, DelDonno, S, Kipman M, Schwab, ZJ, & **Killgore WD**. Grey matter correlates of self-reported sleep duration. Abstract presented at the Harvard Medical School Research Day, Boston, MA, March 28, 2012.
210. **Killgore, WD**. Overlapping and distinct patterns of neurocircuitry across PTSD, Panic Disorder, and Simple Phobia. Abstract presented at the 32nd Annual Conference of the Anxiety Disorders Association of America, Arlington, VA, April 12-15, 2012.
211. **Killgore, WD**, Britton, JC, Rosso, IM, Schwab, ZJ, & Rauch, SL. Shared and unique patterns of cortico-limbic activation across anxiety disorders. Abstract presented at the 67th Annual Meeting of the Society of Biological Psychiatry, Philadelphia, PA, May 3-5, 2012.
212. **Killgore, WD**, Schwab, ZJ, & Rauch, SL. Daytime sleepiness affects prefrontal inhibition of food consumption. Abstract presented at the 67th Annual Meeting of the Society of Biological Psychiatry, Philadelphia, PA, May 3-5, 2012.
213. Rosso, IM, Britton, JC, Makris, N, **Killgore, WD**, Rauch SL, & Stewart ES. Impact of major depression comorbidity on prefrontal and anterior cingulate volumes in pediatric OCD. Abstract presented at the 67th Annual Meeting of the Society of Biological Psychiatry, Philadelphia, PA, May 3-5, 2012.
214. Kipman, M, Weber, M, DelDonno, S., Schwab, ZJ, & **Killgore, WD**. Morningness-Eveningness correlates with orbitofrontal gray matter volume. Abstract presented at the 26th Annual Meeting of the Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.
215. Kipman, M, Schwab, ZJ, Weber, M, DelDonno, S, & **Killgore, WD**. Yawning frequency is correlated with reduced medial thalamic volume. Abstract presented at the 26th Annual Meeting of the Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.
216. Weber, M, DelDonno, S, Kipman M, Schwab, ZJ, & **Killgore WD**. Grey matter correlates of daytime sleepiness. Abstract presented at the 26th Annual Meeting of the Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.
217. Weber, M, DelDonno, S, Kipman M, Schwab, ZJ, & **Killgore WD**. Grey matter correlates of self-reported sleep duration. Abstract presented at the 26th Annual Meeting of the Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.
218. DelDonno, S, Weber, M, Kipman M, Schwab, ZJ, & **Killgore, WD**. Resistance to insufficient sleep correlates with olfactory cortex gray matter. Abstract presented at the 26th Annual Meeting of the Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.
219. DelDonno, S, Schwab, ZJ, Kipman, M, Weber, M, & **Killgore, WD**. Weekend sleep is related to greater coping and resilience capacities. Abstract presented at the 26th Annual Meeting of the

Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.

220. Schwab, ZJ, DelDonno, S, Weber, M, Kipman M, & **Killgore, WD**. Habitual caffeine consumption and cerebral gray matter volume. Abstract presented at the 26th Annual Meeting of the Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.
221. Schwab, ZJ, & **Killgore, WD**. Daytime sleepiness affects prefrontal regulation of food intake. Abstract presented at the 26th Annual Meeting of the Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.
222. **Killgore, WD**, Schwab, ZJ, DelDonno S, Kipman, M, Weber M, & Rauch, SL. Greater nocturnal sleep time is associated with increased default mode functional connectivity. Abstract presented at the 26th Annual Meeting of the Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.
223. **Killgore, WD**, Kamimori, GH, & Balkin, TJ. Caffeine improves efficiency of planning and sequencing abilities during sleep deprivation. Abstract presented at the 26th Annual Meeting of the Associated Professional Sleep Societies, Boston, MA, June 9-13, 2012.
224. Sneider, JT, **Killgore, WD**, Crowley, DJ, Cohen-Gilbert, JE, Schwab, ZJ, & Silveri, MM. Inhibitory capacity in emerging adult binge drinkers: Influence of Facial Cues. Abstract presented at the 35th Annual Scientific Meeting of the Research Society on Alcoholism, San Francisco, CA, June 23-27, 2012.
225. **Killgore WD**. Multimodal neuroimaging to predict cognitive resilience against sleep loss. Abstract presented at the DARPA Young Faculty Award 2012 Meeting, Arlington, VA, July 30-31, 2012. [**Winner Young Faculty Award in Neuroscience*]
226. Cohen-Gilbert, JE, **Killgore WD**, Crowley, DJ, Covell, MJ, Schwab, ZJ, Weiner, MR, Acharya, D, Sneider, JT, & Silveri, MM. Differential influence of safe versus threatening facial expressions on inhibitory control across adolescence and adulthood. Abstract presented at the Society for Neuroscience 2012 Meeting, New Orleans, LA, October 13-17, 2012.
227. Weber, M, DelDonno, S, Kipman M, Schwab, ZJ, & **Killgore WD**. Grey matter correlates of self-reported sleep duration. Abstract presented at the Harvard Division of Sleep Medicine Annual Poster Session, Boston, MA, September 27, 2012.
228. Weber, M, DelDonno, SR, Kipman, M, Preer, LA, Schwab ZJ, Weiner, MR, & **Killgore, WD**. The effect of morning bright light therapy on sleep, cognition and emotion following mild traumatic brain injury. Abstract presented at the 2012 Sleep Research Network Meeting, 22-23 October 2012, Bethesda, MD.
229. Sneider, JT, **Killgore, WD**, Crowley, DJ, Cohen-Gilbert, JE, Schwab, ZJ, & Silveri, MM. Inhibitory capacity in emerging adult binge drinkers: Influence of Facial Cues. Abstract presented at the Annual McLean Hospital Research Day, January 16, 2013.
230. Cohen-Gilbert, JE, **Killgore WD**, Crowley, DJ, Covell, MJ, Schwab, ZJ, Weiner, MR, Acharya, D, Sneider, JT, & Silveri, MM. Differential influence of safe versus threatening facial

expressions on inhibitory control across adolescence and adulthood. Abstract presented at the Annual McLean Hospital Research Day, January 16, 2013.

231. Tkachenko, O, Schwab, ZJ, Kipman, M, DelDonno, S, Gogel, H., Preer, L, & **Killgore, WD**. Smarter women need less sleep. Abstract presented at the Annual McLean Hospital Research Day, January 16, 2013.
232. DelDonno, S, Kipman, M, Schwab, ZJ, & **Killgore, WD**. The contributions of emotional intelligence and facial perception to social intuition. Abstract presented at the Annual McLean Hospital Research Day, January 16, 2013.
233. Kipman, M, Schwab, ZJ, DelDonno, S, Weber, M, Rauch, SL, & **Killgore, WD**. The neurocircuitry of impulsive behavior. Abstract presented at the Annual McLean Hospital Research Day, January 16, 2013.
234. Preer, LA, Tkachenko, O, Gogel, H, Schwab, ZJ, Kipman, M, DelDonno, SR, Weber, M, Webb, CA, & **Killgore, WD**. Emotional intelligence as a mediator of the association between anxiety sensitivity and anxiety symptoms. Abstract presented at the Annual McLean Hospital Research Day, January 16, 2013.
235. Gogel, H, DelDonno, S, Kipman M, Preer, LA, Schwab, ZJ, Tkachenko, O, & **Killgore, WD**. Validation of the Design Organization Test (DOT) in a healthy population. Abstract presented at the Annual McLean Hospital Research Day, January 16, 2013.
236. Brennan, BP, Schwab, ZS, Athey, AJ, Ryan, EM, Pope, HG, **Killgore, WD**, Jenike, MA, & Rauch, SL. A functional magnetic resonance imaging study of rostral anterior cingulate cortex activation in obsessive-compulsive disorder using an emotional counting stroop paradigm. Abstract presented at the Annual McLean Hospital Research Day, January 16, 2013.
237. Cohen-Gilbert, JE, Schwab, ZJ, **Killgore, WD**, Crowley, DJ, & Silveri MM. Influence of Binge Drinking on the Neural Correlates of Inhibitory Control during Emotional Distraction in Young Adults. Abstract presented at the 3rd International Conference on Applications of Neuroimaging to Alcoholism (ICANA-3), New Haven, CT, February 15-18, 2013.
238. Weber, M, & **Killgore, WD**. The interrelationship between ‘sleep credit’, emotional intelligence and mental health – a voxel-based morphometric study. Abstract presented at Harvard Medical School Psychiatry Research Day, April 10, 2013.
239. Cohen-Gilbert, JE, Schwab, ZJ, **Killgore, WD**, Crowley, DJ, & Silveri MM. Influence of Binge Drinking on the Neural Correlates of Inhibitory Control during Emotional Distraction in Young Adults. Abstract presented at Harvard Medical School Psychiatry Research Day, April 10, 2013.
240. Mundy, EA, Weber, M, Rauch, SL, **Killgore, WD**, & Rosso, IM. The relationship between subjective stress levels in childhood and anxiety as well as perceived stress as an adult. Abstract presented at Harvard Medical School Psychiatry Research Day, April 10, 2013.
241. Webb, CA, **Killgore, WD**, Britton, JC, Schwab, ZJ, Price, LM, Weiner, MR, Gold, AL, Rosso,

- IM, Simon, NM, Pollack, MH, & Rauch, SL. Comparing categorical versus dimensional predictors of functional response across three anxiety disorders. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.
242. Preer, LA, Tkachenko, O, Gogel, H, Schwab, ZJ, Kipman, M, DelDonno, SR, Weber, M, Webb, CA, Rauch, SL, & **Killgore, WD**. Linking Sleep Trouble to Neuroticism, Emotional Control, and Impulsiveness. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.
243. Preer, LA, Tkachenko, O, Gogel, H, Schwab, ZJ, Kipman, M, DelDonno, SR, Weber, M, Webb, CA, Rauch, SL, & **Killgore, WD**. Emotional Intelligence as a Mediator of the Association between Anxiety Sensitivity and Anxiety Symptoms. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.
244. Kipman, M, Schwab, ZJ, DelDonno, S, Weber, M, Rauch, SL, & **Killgore, WD**. The neurocircuitry of impulsive behavior. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.
245. Weber, M, **Killgore, WD**, Rosso, IM, Britton, JC, Simon, NM, Pollack, MH, & Rauch, SL. Gray matter correlates of posttraumatic stress disorder—A voxel based morphometry study. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.
246. Weber, M, Penetar, DM, Trksak, GH, DelDonno, SR, Kipman, M, Schwab, ZJ, & **Killgore, WD**. Morning blue wavelength light therapy improves sleep, cognition, emotion and brain function following mild traumatic brain injury. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.
247. Tkachenko, O, Schwab, ZJ, Kipman, M, Preer, LA, Gogel, H, DelDonno, SR, Weber, M, Webb, CA, Rauch, SL, & **Killgore, WD**. Difficulty in falling asleep and staying asleep linked to a sub-clinical increase in symptoms of psychopathology. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.
248. **Killgore, WD**, Schwab, ZJ, Kipman, M, DelDonno, SR, Rauch, SL, & Weber, M. Problems with sleep initiation and sleep maintenance correlate with functional connectivity among primary sensory cortices. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.
249. **Killgore, WD**, Schwab, ZJ, Kipman, M, DelDonno, SR, Rauch, SL, & Weber, M. A Couple of Hours Can Make a Difference: Self-Reported Sleep Correlates with Prefrontal-Amygdala Connectivity and Emotional Functioning. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.
250. Brennan, BP, Schwab, ZS, Athey, AJ, Ryan, EM, Pope, HG, **Killgore, WD**, Jenike, MA, & Rauch, SL. A functional magnetic resonance imaging study of rostral anterior cingulate cortex activation in obsessive-compulsive disorder using an emotional counting stroop paradigm. Abstract presented at the 68th Annual Meeting of the Society of Biological Psychiatry, San Francisco, CA, May 16-18, 2013.

251. Weber, M, & **Killgore, WD**. The interrelationship between ‘sleep credit’, emotional intelligence and mental health – a voxel-based morphometric study. Abstract presented at the SLEEP 2013 Annual Meeting, Baltimore, MD, June 1-5, 2013.
252. Weber, M, Penetar, DM, Trksak, GH, DelDonno, SR, Kipman, M, Schwab, ZJ, & **Killgore, WD**. Morning blue wavelength light therapy improves sleep, cognition, emotion and brain function following mild traumatic brain injury. Abstract presented at the SLEEP 2013 Annual Meeting, Baltimore, MD, June 1-5, 2013.
253. **Killgore, WD**, Schwab, ZJ, Kipman, M, DelDonno, SR, & Weber, M. Problems with Sleep Initiation and Sleep Maintenance Correlate with Functional Connectivity Among Primary Sensory Cortices. Abstract presented at the SLEEP 2013 Annual Meeting, Baltimore, MD, June 1-5, 2013.
254. **Killgore, WD**, Schwab, ZJ, Kipman, M, DelDonno, SR, & Weber, M. A Couple of Hours Can Make a Difference: Self-Reported Sleep Correlates with Prefrontal-Amygdala Connectivity and Emotional Functioning. Abstract presented at the SLEEP 2013 Annual Meeting, Baltimore, MD, June 1-5, 2013.
255. Tkachenko, O, Schwab, ZJ, Kipman, M, DelDonno, SR, Preer, LA, Gogel, H, Weber, M, Webb, CA, & **Killgore, WD**. Difficulty in falling asleep and staying asleep linked to a sub-clinical increase in symptoms of psychopathology. Abstract presented at the SLEEP 2013 Annual Meeting, Baltimore, MD, June 1-5, 2013.
256. Preer, LA, Tkachenko, O, Gogel, H, Schwab, ZJ, Kipman, M, DelDonno, SR, Weber, M, Webb, CA, & **Killgore, WD**. Linking Sleep Initiation Trouble to Neuroticism, Emotional Control, and Impulsiveness. Abstract presented at the SLEEP 2013 Annual Meeting, Baltimore, MD, June 1-5, 2013.
257. **Killgore, WD**. Sleep duration contributes to cortico-limbic functional connectivity, emotional functioning, & psychological health. Abstract presented at the 52nd Annual Meeting of the American College of Neuropsychopharmacology, Hollywood, FL, December 8-12, 2013.
258. Preer, L, Tkachenko, O, Gogel, H, Bark, JS, Kipman, M, Olson, EA, & **Killgore, WD**. The role of personality in sleep initiation problems. Abstract presented at the Annual McLean Hospital Research Day, January 22, 2014.
259. Demers, LA, Olson, EA, Weber, M, Divatia, S, Preer, L, & **Killgore, WD**. Paranoid traits are related to deficits in complex social decision-making and reduced superior temporal sulcus volume. Abstract presented at the Annual McLean Hospital Research Day, January 22, 2014.
260. Tkachenko, O, Weber, M, Gogel, H, & **Killgore, WD**. Predisposition towards unhealthy foods linked with increased gray matter in the cerebellum. Abstract presented at the Annual McLean Hospital Research Day, January 22, 2014.
261. Olson, EA, Weber, M, Tkachenko, O, & **Killgore, WD**. Daytime sleepiness is associated with decreased integration of remote outcomes on the IGT. Abstract presented at the Annual

McLean Hospital Research Day, January 22, 2014.

262. Cui, J, Tkachenko, O, & **Killgore, WD**. Can the activation of anterior cingulate predict the emotional suppression? An fMRI study with masked faces. Abstract presented at the Annual McLean Hospital Research Day, January 22, 2014.
263. Gogel, H, & **Killgore WDS**. A psychometric validation of the Design Organization Test (DOT) in a healthy sample. Abstract presented at the 42nd Annual Meeting of the International Neuropsychological Society, Seattle WA, February 12-15, 2014.
264. **Killgore, WD**, Kipman, M, Tkachenko, O, Gogel, H., Preer, L, Demers, LA, Divatia, SC, Olson, EA, & Weber, M. Predicting resilience against sleep loss with multi-modal neuroimaging. Abstract presented at the 42nd Annual Meeting of the International Neuropsychological Society, Seattle WA, February 12-15, 2014.
265. **Killgore, WD**, Weber, M, Bark, JS, Kipman, M, Gogel, H, Preer, L, Tkachenko, O, Demers, LA, Divatia, SC, & Olson, EA. Physical exercise correlates with hippocampal volume in healthy adults. Abstract presented at the 42nd Annual Meeting of the International Neuropsychological Society, Seattle WA, February 12-15, 2014.
266. **Killgore, WD**, Tkachenko, O, Weber, M, Kipman, M, Preer, L, Gogel, H, & Olson, EA. The association between sleep, functional connectivity, and emotional functioning. Abstract presented at the 42nd Annual Meeting of the International Neuropsychological Society, Seattle WA, February 12-15, 2014.
267. Preer, L, Tkachenko, O, Gogel, H, Bark, JS, Kipman, M, Olson, EA, & **Killgore, WD**. The role of personality in sleep initiation problems. Abstract presented at the 42nd Annual Meeting of the International Neuropsychological Society, Seattle WA, February 12-15, 2014.
268. Tkachenko, O, Weber, M, Olson, EA, Gogel, H, Preer, LA, Divatia, SC, Demers, LA, & **Killgore, WD**. Gray matter volume within the medial prefrontal cortex correlates with behavioral risk taking. Abstract presented at the 42nd Annual Meeting of the International Neuropsychological Society, Seattle WA, February 12-15, 2014.
269. Olson, EA, Weber, M, Bark JS, Demers L, Divatia, SC, Gogel, H, Kipman M, Preer, L, Tkachenko, O, & **Killgore, WD**. Sex differences in threat evaluation of emotionally neutral faces. Abstract presented at the 42nd Annual Meeting of the International Neuropsychological Society, Seattle WA, February 12-15, 2014.
270. Cui, J, Tkachenko, O, & **Killgore, WD**. Can the activation of anterior cingulate predict the emotional suppression? An fMRI study with masked faces. Abstract presented at the 36nd Annual Conference of the Anxiety Disorders Association of America, Chicago, IL, March 27-30, 2014.
271. Webb, CA, Weber, M, Mundy, EA, & **Killgore, WD**. Reduced gray matter volume in the anterior cingulate, orbitofrontal cortex and thalamus as a function of depressive symptoms: A voxel-based morphometric analysis. Abstract presented at the 36nd Annual Conference of the Anxiety Disorders Association of America, Chicago, IL, March 27-30, 2014.

272. Weber, M, Penetar, DM, Trksak, GH, Kipman, M, Tkachenko, O, Bark, JS, Jorgensen, AL, Rauch, SL, & **Killgore, WD**. Light therapy may improve sleep and facilitate recovery from mild traumatic brain injury. Abstract presented at the 10th World Congress on Brain Injury, San Francisco, CA, March 19-22, 2014.
273. Cui, J, Tkachenko, O, & **Killgore, WD**. Can the activation of anterior cingulate predict the emotional suppression? An fMRI study with masked faces. Abstract presented at the 21st Annual Meeting of the Cognitive Neuroscience Society, Boston, MA, April 5-8, 2014.
274. Divatia, S, Demers, LA, Preer, L, Olson, EA, Weber, M, & **Killgore, WD**. Advantageous decision making linked with increased gray matter volume in the ventromedial prefrontal cortex. Abstract presented at the 21st Annual Meeting of the Cognitive Neuroscience Society, Boston, MA, April 5-8, 2014.
275. Demers, LA, Olson, EA, Weber, M, Divatia, S, Preer, L, & **Killgore, WD**. Paranoid traits are related to deficits in complex social decision making and reduced superior temporal sulcus volume. Abstract presented at the 21st Annual Meeting of the Cognitive Neuroscience Society, Boston, MA, April 5-8, 2014.
276. Preer, LA, Weber, M, Tkachenko, O, Divatia, S, Demers, LA, Olson, EA, & **Killgore, WD**. Gray matter volume in the amygdala is associated with facial assessments of trustworthiness. Abstract presented at the 21st Annual Meeting of the Cognitive Neuroscience Society, Boston, MA, April 5-8, 2014.
277. Tkachenko, O, Weber, M, Gogel, H, & **Killgore, WD**. Predisposition towards unhealthy foods linked with increased gray matter volume in the cerebellum. Abstract presented at the 21st Annual Meeting of the Cognitive Neuroscience Society, Boston, MA, April 5-8, 2014.
278. Olson, EA, Weber, M, Gogel, H, & **Killgore, WD**. Daytime sleepiness is associated with decreased integration of remote outcomes on the IGT. Abstract presented at the 21st Annual Meeting of the Cognitive Neuroscience Society, Boston, MA, April 5-8, 2014.
279. Demers, LA, Preer, LA, Gogel, H, Olson, EA, Weber, M, & **Killgore, WD**. Left-hemifield bias on sad chimeric face task correlates with interpersonal emotional intelligence. Abstract presented at the 69th Annual Meeting of the Society of Biological Psychiatry, New York, NY, May 8-10, 2014.
280. Weber, M, **Killgore, WD**, Olson, EA, Rosso, IM, & Rauch, SL. Morphological brain network organization in relation to trauma and posttraumatic stress disorder. Abstract presented at the 69th Annual Meeting of the Society of Biological Psychiatry, New York, NY, May 8-10, 2014.
281. Divatia, S, Demers, LA, Preer, L, Gogel, H, Kipman, M, & **Killgore, WD**. Schizotypal and manic traits are associated with poorer perception of emotions in healthy individuals. Abstract presented at the 69th Annual Meeting of the Society of Biological Psychiatry, New York, NY, May 8-10, 2014.

282. **Killgore, WD**, Weber, M, Olson, EA, & Rauch, SL. Sleep reduction and functioning of the emotion regulation circuitry. Abstract presented at the 69th Annual Meeting of the Society of Biological Psychiatry, New York, NY, May 8-10, 2014. [**Blue Ribbon Finalist for Top Poster Award: Basic Neuroscience*]
283. Webb, CA, Weber, M, Mundy, EA, & **Killgore, WD**. Reduced gray matter volume in the anterior cingulate, orbitofrontal cortex and thalamus as a function of depressive symptoms: A voxel-based morphometric analysis. Abstract presented at the 69th Annual Meeting of the Society of Biological Psychiatry, New York, NY, May 8-10, 2014.
284. Marin MF, Song H, Landau AJ, Lasko NB, Foy Preer LA, Campbell A, Pace-Schott EF, **Killgore WD**, Orr SP, Pitman RK, Simon NM, Milad MR (2014). Psychophysiological and Neuroimaging Correlates of Fear Extinction Deficits Across Anxiety Disorders. Abstract presented at the 69th Annual Meeting of the Society of Biological Psychiatry, New York, NY, May 8-10, 2014.
285. **Killgore, WD**. The effects of sleep loss on food preference. Abstract presented at SLEEP 2014, Minneapolis, MN, May 31-June 4, 2014.
286. Weber, M, & **Killgore, WD**. Sleep habits reflect in functional brain network organization. Abstract presented at SLEEP 2014, Minneapolis, MN, May 31-June 4, 2014. [**2014 AASM Young Investigator Award, Honorable Mention*]
287. Freed, MC, Novak, LA, **Killgore, WD**, Koehlmoos, TP, Ginsberg, JP, Krupnick, J, Rauch S, Rizzo, A, Engle, CC. DoD IRB delays: Do they really matter? And if so, why and for whom? Abstract presented at the Military Health System Research Symposium, Fort Lauderdale, FL, August 18-21, 2014.
288. Freed, MC, Novak, LA, **Killgore, WD**, Koehlmoos, TP, Ginsberg, JP, Krupnick, J, Rauch S, Rizzo, A, Engle, CC. DoD IRB delays: Do they really matter? And if so, why and for whom? Abstract presented at the AMSUS Annual Meeting, Washington DC, December 2-5, 2014.
289. **Killgore, WD**, Demers, LA, Olson, EA, Rosso, IM, Webb, CA, & Rauch, SL. Anterior cingulate gyrus and sulcus thickness: A potential predictor of remission following internet-based cognitive behavioral therapy for major depressive disorder. Abstract presented at the 53rd Annual Meeting of the American College of Neuropsychopharmacology, Phoenix, AZ, December 7-11, 2014.
290. Olson, EA, Buchholz, J, Rosso, IM, **Killgore, WD**, Webb, CA, Gogel, H, & Rauch, SL. Internet-based cognitive behavioral therapy effects on symptom severity in major depressive disorder: preliminary results from a randomized controlled trial. Abstract presented at the 53rd Annual Meeting of the American College of Neuropsychopharmacology, Phoenix, AZ, December 7-11, 2014.
291. Brennan, B, Tkachenko, O, Schwab, Z, Ryan, E, Athey, A, Pope, H, Dougherty, D, Jenike, M, **Killgore, WD**, Hudson, J, Jensen, E, & Rauch SL. Abstract presented at the 53rd Annual Meeting of the American College of Neuropsychopharmacology, Phoenix, AZ, December 7-11, 2014.

292. Alkozei, A, Pisner, D, & **Killgore, WD**. Emotional intelligence is differentially correlated with prefrontal cortical responses to backward masked fearful and angry faces. Abstract presented at the 43rd Annual Meeting of the International Neuropsychological Society, Denver, CO, February 4-7, 2015.
293. Alkozei, A, Schwab, Z, & **Killgore, WD**. Looking for evil intent: Emotional intelligence and the use of socially relevant facial cues during an emotional decision making task. Abstract presented at the 43rd Annual Meeting of the International Neuropsychological Society, Denver, CO, February 4-7, 2015.
294. Shane, BR, Alkozei, A, & **Killgore, WD**. The contribution of general intelligence and emotional intelligence to the ability to appreciate humor. Abstract presented at the 43rd Annual Meeting of the International Neuropsychological Society, Denver, CO, February 4-7, 2015.
295. Markowski, SM, Alkozei, A, & **Killgore, WD**. Sleep onset latency and duration are associated with self-perceived invincibility. Abstract presented at the 43rd Annual Meeting of the International Neuropsychological Society, Denver, CO, February 4-7, 2015.
296. Pisner, D, Alkozei, A, & **Killgore, WD**. Visuospatial reasoning mediates the relationship between emotion recognition and emotional intelligence. Abstract presented at the 43rd Annual Meeting of the International Neuropsychological Society, Denver, CO, February 4-7, 2015.
297. Vanuk, JR, Fridman, A, Demers, LA, Divatia, S, & **Killgore, WD**. Engaging in meditation and internet based training as a means of enhancing emotional intelligence. Abstract presented at the 43rd Annual Meeting of the International Neuropsychological Society, Denver, CO, February 4-7, 2015.
298. Vanuk, JR, Divatia, S, Demers, LA, Markowski, SM, & **Killgore, WD**. Napping in conjunction with brief internet-based training as a means of enhancing emotional intelligence. Abstract presented at the 43rd Annual Meeting of the International Neuropsychological Society, Denver, CO, February 4-7, 2015.
299. Cui, J, Tkachenko, O, Gogel, H, Kipman, M, Preer, LA, Weber, M, Divatia, SC, Demers, LA, Olson, EA, Buchholz, JL, Bark, JS, Rosso, IM, Rauch, SL, & **Killgore, WD**. Fractional Anisotropy of frontoparietal connections predicts individual resistance to sleep deprivation. Abstract presented at the 43rd Annual Meeting of the International Neuropsychological Society, Denver, CO, February 4-7, 2015.
300. **Killgore, WD**, Olson, EA, Weber, M, Rauch, SL, & Nickerson, LD. Emotional intelligence is associated with coordinated resting state activity between emotion regulation and interoceptive experience networks. Abstract presented at the 43rd Annual Meeting of the International Neuropsychological Society, Denver, CO, February 4-7, 2015.
301. **Killgore, WD**, Demers, LA, Divatia, S, Kipman, M, Tkachenko, O, Weber, M, Preer, LA, Gogel, H, Olson, EA, Vanuk, JR, & Rauch, SL. Enhancing emotional intelligence via brief internet-based training. Abstract presented at the 43rd Annual Meeting of the International

Neuropsychological Society, Denver, CO, February 4-7, 2015.

302. Buchholz, JL, Rosso, IM, Olson, EA, **Killgore, WD**, Fukunaga, R, Webb, CA, & Rauch, SL. Internet-based cognitive behavioral therapy is associated with symptom reduction and cognitive restructuring in adults with major depressive disorder. Abstract presented at the Anxiety and Depression Conference, Miami, FL, April 9-12, 2015.
303. Alkozei, A, Pisner, D, Rauch, SL, & **Killgore, WD**. Emotional intelligence and subliminal presentations of social threat. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
304. Shane, BR, Alkozei, A, Vanuk, JR, Weber, M, & **Killgore, WD**. The effect of bright light therapy for improving sleep among individuals with mild traumatic brain injury. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
305. Vanuk, JR, Shane, BR, Alkozei, A, & **Killgore, WD**. Trait emotional intelligence is associated with greater resting state functional connectivity within the default mode and task positive networks. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
306. Vanuk, JR, Fridman, A, Demers, LA, & **Killgore, WD**. Engaging in meditation and internet-based training as a means of enhancing emotional intelligence. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
307. Pisner, D, Alkozei, A, & **Killgore, WD**. Trait emotional suppression is associated with decreased activation of the insula and thalamus in response to masked angry faces. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
308. Markowski, SM, Alkozei, A, & **Killgore, WD**. The trait of neuroticism predicts neurocognitive performance in healthy individuals. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
309. Buchholz, JL, Rosso, IM, **Killgore, WD**, Fukunaga, R, Olson, EA, Demers, LA, & Rauch, SL. Amygdala volume is associated with helplessness in adults with major depressive disorder (MDD). Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
310. Sneider, JT, **Killgore, WD**, Rauch, SL, Jensen, JE, & Silveri, MM. Sex differences in the associations between prefrontal GABA and resistance to sleep deprivation. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
311. **Killgore, WD**, Rosso, IM, Rauch, SL, & Nickerson, LD. Emotional intelligence correlates with coordinated resting state activity between brain networks involved in emotion regulation and interoceptive experience. Abstract presented at the 70th Annual Meeting of the Society of

Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.

312. **Killgore, WD**, Demers, LA, Divatia, S, Rosso, IM, & Rauch, SL. Boosting Emotional intelligence with a brief internet-based program. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
313. **Killgore, WD**, Vanuk, JR, Alkozei, A, Markowski, SM, Pisner, D, Shane, BR, Fridman, A, & Knight, SA. Greater daytime sleepiness correlates with altered thalamocortical connectivity. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
314. **Killgore, WD**, Tkachenko, O, Gogel, H, Kipman, M, Sonis, LA, Divatia, SC, Demers, LA, Olson, EA, Buchholz, JL, Rosso, IM, & Rauch, SL. Activation of the ventral striatum predicts overeating during subsequent sleep loss. Abstract presented at the 70th Annual Meeting of the Society of Biological Psychiatry, Toronto, Ontario, CA, May 14-16, 2015.
315. Alkozei, A, Markowski, SM, Shane, BR, Rauch, SL, & **Killgore, WD**. Emotional resilience is not associated with increased emotional resistance to sleep deprivation. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.
316. Alkozei, A, Pisner, D, Markowski, SM, Rauch, SL, & **Killgore, WD**. The effect of emotional resilience on changes in appetite for high-sugary food during sleep loss. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.
317. Markowski, SM, Alkozei, A, Rauch, SL, & **Killgore, WD**. Self-perceived invincibility is associated with sleep onset latency and duration. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.
318. Markowski, SM, Alkozei, A, Rauch, SL, & **Killgore, WD**. Sex differences in the association between personality and resistance to sleep deprivation. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.
319. Shane, BR, Alkozei, A, & **Killgore, WD**. Physical exercise may contribute to vulnerability to sleep deprivation. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.
320. Cui, J, Tkachenko, O, Gogel, H, Kipman, M, Sonis, LA, Weber, M, Divatia, SC, Demers, LA, Olson, EA, Buchholz, JL, Rosso, IM, Rauch, SL, & **Killgore, WD**. Resistance to sleep deprivation involves greater functional activation and white matter connectivity within a fronto-parietal network. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.
321. Vanuk, JR, Rosso, IM, Rauch, SL, Alkozei, A, Markowski, SM, Pisner, D, Shane, BR, Fridman A, Knight, SA, & **Killgore, WD**. Daytime sleepiness is associated with altered thalamocortical connectivity. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.
322. Sneider, JT, Jensen JE, Silveri, MM, & **Killgore, WD**. Prefrontal GABA predicts resistance to

sleep deprivation. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.

323. **Killgore, WD**, Tkachenko, O, Gogel, H, Kipman, M, Sonis, LA, Weber, M, Divatia, SC, Demers, LA, Olson, EA, Buchholz, JL, Rosso, IM, & Rauch, SL. Individual differences in rested activation of the ventral striatum predict overeating during sleep deprivation. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.
324. **Killgore, WD**, Tkachenko, Rosso, IM, Rauch, SL, & Nickerson, LA. Multimodal neuroimaging to predict resistance to sleep deprivation. Abstract presented at the SLEEP 2015 Meeting, Seattle, WA, June 6-10, 2015.
325. Nickerson, LD & **Killgore, WD**. Resting state brain circuits underpinning a neurobiological model of Theory of Mind and Mentalizing. Abstract presented at the Organization for Human Brain Mapping Annual Meeting, 2015, Honolulu, HI, June 14-18, 2015.
326. Rosso, IM, Olson, EA, **Killgore WD**, Fukunaga, R, Webb, CA, & Rauch SL. A randomized trial of internet-based cognitive behavioral therapy for major depressive disorder. Abstract presented at the 54th Annual Meeting of the American College of Neuropsychopharmacology, Hollywood, FL, December 6-10, 2015.
327. Alkozei, A & **Killgore, WD**. Exposure to blue wavelength light is associated with increased dorsolateral prefrontal cortex responses during a working memory task. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
328. Klimova, A, Pisner, D & **Killgore, WD**. Neural correlates of cognitive and emotional impairments in acute versus chronic mild traumatic brain injury: a diffusion tensor imaging study. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
329. Markowski, S, Alkozei, A, & **Killgore, WD**. Greater neuroticism predicts higher performance in immediate memory, language, and attention in healthy individuals. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
330. Alkozei, A & **Killgore, WD**. Exposure to blue wavelength light suppresses anterior cingulate cortex activation in response to uncertainty during anticipation of negative or positive stimuli. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
331. Smith, R, Alkozei, A, Bao, J, & **Killgore, WD**. Successful goal-directed memory suppression is associated with increased inter-hemispheric coordination between right and left fronto-parietal control networks. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
332. Singh, P, Fridman, A, Pisner, D, Singh, A, & **Killgore, WD**. A voxel based morphometric analysis of ventromedial prefrontal cortex volume related with executive function task

performance post mild traumatic injury. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.

- 333. **Killgore, WD.** Baseline responsiveness of the ventral striatum predicts overeating during subsequent sleep deprivation. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
- 334. **Killgore, WD & Nickerson, LD.** Predicting resistance to sleep deprivation using multimodal neuroimaging. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
- 335. **Sneider, J, Jensen, JE, Silveri, MM, & Killgore, WD.** Prefrontal GABA correlates with the ability to sustain vigilance during sleep deprivation. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
- 336. **Buchholz, JL, Olson, EA, Fukunaga, R, Webb, CA, Killgore, WD, Rauch, SL, & Rosso, IM.** Expressive suppression is associated with greater lateral orbitofrontal cortex volume in adults with major depressive disorder. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
- 337. **Fridman, A, Pisner, D, Singh, P, & Killgore, WD.** Gray matter volume in left medial prefrontal cortex is related to life satisfaction in individuals with mild traumatic brain injury. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
- 338. **Singh, P, Pisner, D, Fridman, A, Roberts, S, & Killgore, WD.** Volumetric differences in gray matter in healthy versus overweight/obese individuals post mild traumatic brain injury: A voxel based morphometric study. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
- 339. **Killgore, WD & Weber, M.** Blue wavelength light therapy reduces daytime sleepiness following mild traumatic brain injury. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
- 340. **Killgore, WD, Weber, M, & Penetar, D.** Blue wavelength light therapy improves balance following mild traumatic brain injury. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
- 341. **Pisner, D, Smith, R, Alkozei, A, Klimova, A, & Killgore, WD.** Highways of the emotional intellect: White matter microstructural correlates of an ability-based measure of emotional intelligence. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
- 342. **Vanuk, JR, Smith, R, Knight, S, & Killgore, WD.** Resting RSA correlates with coordinated resting state activity between brain networks involved in emotion perception. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.

343. Vanuk, JR, Alkozei, A, Markowski, S, & **Killgore WD**. Greater resting state functional connectivity within the default mode and task positive networks is associated with trait emotional intelligence. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
344. Fukunaga, R, Webb, CA, Olson, EA, **Killgore, WD**, Rauch, SL, & Rosso, IM. Reduced rostral anterior cingulate volume is associated with greater frequency of negative automatic thoughts in adults with major depressive disorder. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
345. Olson, EA, Fukunaga, R., Webb, CA, Rosso, IM, **Killgore, WD**, & Rauch, SL. Delay discounting and anhedonia are independently associated with suicidal ideation in depression. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
346. Pisner, D, Singh, P, Fridman, A, & **Killgore, WD**. Resilience following mild traumatic brain injury is associated with gray matter volume in the left precentral gyrus. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
347. Sing, P, Fridman, A, Pisner, D, & **Killgore, WD**. Time dependent differences in gray matter volume in individuals post mild traumatic brain injury: A voxel based morphometric study. Abstract presented at the 44th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 3-6, 2016.
348. Quan, M, Gruber, SA, Lukas, SE, Hill, KP, **Killgore, WD**, & Nickerson, LD. Altered functional connectivity within large-scale brain networks during a cognitive task in chronic marijuana smokers. Abstract presented at the Harvard Psychiatry Research Day, Boston, MA, March 23, 2016. [**Semi Finalist Poster: Harvard Medical School Mysell Award*]
349. Fukunaga, R, Webb, CA, Olson, EA, **Killgore, WD**, Rauch, SL, & Rosso, IM. Improvement in negative automatic thoughts as a mediator of symptom improvement in internet-based cognitive behavioral therapy for major depressive disorder. Abstract presented at the 2016 Meeting of the Anxiety and Depression Association of America, Philadelphia, PA, March 31-April 3, 2016.
350. Bernstein, AS, Pisner, D, Klimova, A, Umapathy, L, Do, L, Squire, S, **Killgore, WD**, & Trouard, T. Effects of multiband acceleration on high angular resolution diffusion imaging data collection, processing, and analysis. Abstract presented at the 24th Annual Meeting of the International Society for Magnetic Resonance in Medicine (IMSRM), Singapore, May 7-8, 2016.
351. Alkozei, A, Markowski, SM, Pisner, D, Fridman, A, Shane, BR, Vanuk, JR, Knight, SA, & **Killgore, WD**. Exposure to blue wavelength light reduces activation within the anterior cingulate cortex during anticipation of certain reward stimuli. Abstract presented at the 71st Annual Scientific Convention of the Society for Biological Psychiatry, Atlanta, GA, May 12-14, 2016.

352. Alkozei, A., Pisner, D, Markowski, SM, Vanuk, JR, Fridman, A, Shane, BR, Knight SA, & **Killgore, WD**. Increases in prefrontal activation after exposure to blue versus amber wavelength light during cognitive load. Abstract presented at the 71st Annual Scientific Convention of the Society for Biological Psychiatry, Atlanta, GA, May 12-14, 2016.
353. Pisner, DA, Smith, R, Alkozei, A, Klimova, A, Millan, M, & **Killgore, WD**. Highways of the emotional intellect: White matter microstructural correlates of an ability-based measure of emotional intelligence. Abstract presented at the 71st Annual Scientific Convention of the Society for Biological Psychiatry, Atlanta, GA, May 12-14, 2016.
354. Singh, P, Pisner, D, Fridman, A, Singh A, Millan, M, & **Killgore, WD**. A voxel based morphometric analysis of ventromedial prefrontal cortex volume related with executive function task performance post mild traumatic brain injury. Abstract presented at the 71st Annual Scientific Convention of the Society for Biological Psychiatry, Atlanta, GA, May 12-14, 2016.
355. Smith, R, Smith, C, Khodr, O, Nettles, M, Sanova, A, & **Killgore, WD**. Emotional working memory: A relatively unexplored aspect of emotional and cognitive ability. Abstract presented at the 71st Annual Scientific Convention of the Society for Biological Psychiatry, Atlanta, GA, May 12-14, 2016.
356. Smith, R, Nettles, M, Khodr, O, Sanova, A, Smith, C, Alkozei, A, & **Killgore, WD**. Conflict-related dorsomedial frontal activation during healthy food decisions is associated with increased cravings for high-fat foods. Abstract presented at the 71st Annual Scientific Convention of the Society for Biological Psychiatry, Atlanta, GA, May 12-14, 2016.
357. Smith, R, Sanova, A, Nettles, M, Khodr, O, Smith, C, Alkozei, A, Lane, RD, & **Killgore, WD**. Unwanted reminders: The effects of emotional memory suppression on later neuro-cognitive processing. Abstract presented at the 71st Annual Scientific Convention of the Society for Biological Psychiatry, Atlanta, GA, May 12-14, 2016.
358. **Killgore, WD**, Weber, M, Palmer, W, & Penetar, D. Blue wavelength light therapy improves balance following mild traumatic brain injury. Abstract presented at the 71st Annual Scientific Convention of the Society for Biological Psychiatry, Atlanta, GA, May 12-14, 2016.
359. **Killgore, WD**, Tkachenko, O, Palmer, W, & Rauch, SL. Default mode activation predicts vulnerability to sleep deprivation in domains of mood, sleepiness, and vigilance. Abstract presented at the 71st Annual Scientific Convention of the Society for Biological Psychiatry, Atlanta, GA, May 12-14, 2016.
360. Alkozei, A, Markowski, SM, Pisner, D, Fridman, A, Shane, BR, Vanuk, JR, Knight, SA, Grandner, MA, & **Killgore, WD**. Exposure to blue wavelength light reduces activation within the anterior cingulate cortex during anticipation of certain reward stimuli. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
361. Alkozei, A, Pisner, D, Markowski, SM, Vanuk, JR, Fridman, A, Shane, BR, Knight, SA, Grandner, MA, & **Killgore, WD**. Exposure to blue wavelength light is associated with

increased dorsolateral prefrontal cortex responses and increases in response times during a working memory task. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.

- 362. Davis, B, Yang, R, **Killgore, WD**, Gallagher, RA, Carrazco, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Nightmares in a community sample: Prevalance and associations with daytime function independent of poor sleep quality and depression. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 363. Fisseha, E, Havens, C, **Killgore, WD**, Gallagher, RA, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Sleep duration's important role in the relationship among difficulty concentrating, fatigue, stress, and depressed mood: Data from the SHADES study. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 364. Graham, PM, Goldstein, M, David, BM, Perlis, ML, Perfect, MM, Frye, S, **Killgore, WD**, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Longitudinal analysis of sleep duration using actigraphy and sleep diary: Stability and agreement over 8-11 months. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 365. Granados, K, Rojo-Wissar, DM, Chakravorty, S, Prather, A, Perfect, MM, Frye, S, **Killgore, WD**, Gallagher, RA, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Adverse childhood exposures associated with adult insomnia symptoms. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 366. Grandner, MA, **Killgore, WD**, Khader, W, & Perlis, ML. Positive and negative mood ratings across 24-hours. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 367. Hall, C, Forbush, S, Youngstedt, S, **Killgore, WD**, Barilla, H, Gehrels, J, Alfonso-Miller, P, Palmer, W, Carrazco, N, & Grandner, MA. Habitual sleep duration and health: A possible role for exercise. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 368. Jackson, N, Patterson, F, Seixas, A, Jean-Louis, G, **Killgore, WD**, & Grandner, MA. Using big data to determine the social, behavioral, and environmental, determinants of sleep duration in the U.S. population: Application of a machine learning approach to data from approximately 700,000 Americans. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 369. **Killgore, WD**, Tkachenko, O, Grandner, MA, & Rauch, SL. Default mode activation predicts vulnerability to sleep deprivation in the domains of mood, sleepiness, and vigilance. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.

370. **Killgore, WD**, Weber, M, Grandner, MA, & Penetar, DM. Blue wavelength light therapy improves balance following mild traumatic brain injury. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
371. Knight, SA & Killgore, WD. Typical sleep duration is associated with constructive thinking patterns. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
372. Kotzin, MD, Alkozei, A, Knight, SA, Grandner, MA, & **Killgore, WD**. The effects of trait gratitude on quality of sleep, intrusiveness, of pre-sleep cognitions, and daytime energy in healthy individuals. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
373. Markowski, SM, Alkozei, A, McIntosh, MB, Grandner, MA, & **Killgore, WD**. Chronotype and risk-taking propensity. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
374. McIntosh, MB, Markowski, SM, Grandner, MA, & **Killgore, WD**. Prior-night sleep duration is negatively associated with impulsivity in women. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
375. Ocano, D, Jean-Louis, G, **Killgore, WD**, Gallagher, RA, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Sleep duration and decreased social support from family, friends, and significant other: Influence of insomnia and perceived stress level. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
376. Okuagu, A, Perlis, ML, Ellis, JA, Prather, AA, **Killgore, WD**, Gallagher, RA, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Does thinking keep people awake? Or does it matter what they are thinking about? Self-directed cognitions associated with insomnia and insufficient sleep. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
377. Olivier, K, Gallagher, RA, **Killgore, WD**, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Development and initial validation of the Assessment of Sleep Environment: A novel inventory for describing and quantifying the impact of environmental factors on sleep. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
378. Paine, KN, Forbush, S, Ellis, J, Nowakowski, S, Newman-Smith, K, **Killgore, WD**, Gallagher, RA, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Sleep duration and satisfaction with life, health, finances and relationship. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
379. Rhee, JU, Haynes, P, Chakravorty, S, Patterson, F, **Killgore, WD**, Gallagher, RA, Carrazco, N,

Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Susceptibility to smoking during the day and its relationship with insomnia and sleep duration. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.

- 380. Roberts, SE, Singh, P, Grandner, MA, & **Killgore, WD**. Later wake up time and impulsivity. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 381. Saccone, J, Davis, B, Chakravorty, S, **Killgore, WD**, Gallagher, RA, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Habitual caffeine use and motivation to consume caffeine: Associations with sleep duration, sleepiness, fatigue, and insomnia severity. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 382. Singh, A, Fridman, A, Silveri, MM, Grandner, MA, & **Killgore, WD**. Medial prefrontal GABA predicts hunger ratings during sleep deprivation for men but not women. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 383. Vanuk, JR, Alkozei, A, Smith, R, Pisner, D, Markowski, SM, Shane, BR, Fridman, A, Knight, SA, Grandner, MA, & **Killgore, WD**. Changes in heart rate variability due to light exposure predict frontoparietal connectivity. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 384. Vanuk, JR, Alkozei, A, Knight, SA, Fridman, A, Markowski, SM, Pisner, D, Shane, BR, Grandner, MA, & **Killgore, WD**. The effects of light exposure on heart rate variability predict sleepiness and vigilance. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 385. Warlick, C, Chakravorty, S, **Killgore, WD**, Gallagher, RA, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Timing of alcohol intake associated with insomnia symptoms. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 386. Waugaman, DL, Markowski, SM, Alkozei, A, Grandner, MA, & **Killgore, WD**. Chronotype and Emotional Intelligence. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 387. Weber, M, Grandner, MA, & **Killgore, WD**. Smaller gray matter volume of the visual cortex predicts vulnerability to sleep deprivation. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
- 388. Weber, M, Grandner, MA, & **Killgore, WD**. Blue wavelength light therapy reduces daytime sleepiness following mild traumatic brain injury. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.

389. Yang, R, Ocano, D, Chakravorty, S, **Killgore, WD**, Gallagher, RA, Carrazco, N, Alfonso-Miller, P, Gehrels, J, & Grandner, MA. Relationship between insomnia and depression moderated by caffeine. Abstract presented at the 30th Annual Meeting of the Associated Professional Sleep Societies (SLEEP 2016), Denver, CO, June 11-15, 2016.
390. **Killgore, WD**, Vanuk, JR, Pisner, D, Penetar, DM, & Weber, M. Short wavelength light therapy facilitates recovery from mild traumatic brain injury. Abstract presented at the 2016 Military Health System Research Symposium (MHSRS), Orlando, FL, August 15-18, 2016.
391. **Killgore, WD**, Alkozei, A, Smith, R, Divatia, S, & Demers, L. Enhancing emotional intelligence skills with a brief internet-based program: A pilot study. Abstract presented at the 2016 Military Health System Research Symposium (MHSRS), Orlando, FL, August 15-18, 2016.
392. **Killgore, WD**, Rosso, IM, Olson, EA, Webb, CA, Fukunaga, R, Gogel, H, Buchholz, JL, & Rauch, SL. Efficacy of an internet-based cognitive behavior therapy program for major depression. Abstract presented at the 2016 Military Health System Research Symposium (MHSRS), Orlando, FL, August 15-18, 2016.
393. **Killgore, WD**, & Nickerson, LA. Linked analysis of multimodal neuroimaging identifies neural systems associated with the ability to resist sleep deprivation. Abstract presented at the 2016 Military Health System Research Symposium (MHSRS), Orlando, FL, August 15-18, 2016.
394. Vanuk, JR, Allen, JJB, & **Killgore, WD**. Heart rate variability during light exposure and subsequent network connectivity patterns. Abstract presented at the Annual Meeting of the Society for Psychophysiological Research, Minneapolis, MN, September 21-25, 2016
395. Rosso, IM, Olson, EA, Thomas, MO, Webb, CA, **Killgore, WD**, & Rauch, SL. Anterior cingulate cortex morphology predicts remission from major depression following internet-based cognitive behavior therapy. Abstract submitted for presentation at the 55th Annual Meeting of the American College of Neuropsychopharmacology, Hollywood, FL, December 4-8, 2016.
396. Franco, J, Millan, M, Shane, BR, Castellanos, A, **Killgore, WD**. Blue wavelength light therapy increases thalamic grey matter volume following mild traumatic brain injury. Abstract accepted for presentation at the 45th Annual Meeting of the International Neuropsychological Society, New Orleans, LA, February 1-4, 2017.
397. Alkozei, A, Smith, R, Demers, LA, Divatia, S, Weber, M, Berryhill, SM, & **Killgore, WD**. Emotional intelligence can be trained via an online training program and is associated with better performance on the IGT. Abstract accepted for oral platform presentation at the 45th Annual Meeting of the International Neuropsychological Society, New Orleans, LA, February 1-4, 2017.
398. Haberman, JT, Olson, EA, Webb, CA, **Killgore, WD**, Rauch, SL, & Rosso, IM. The relation between treatment expectancies and outcome in internet-based cognitive behavioral therapy for major depressive disorder. Abstract presented at the Association for Behavioral and Cognitive Therapies, New York, NY, October 27-30, 2016.

AWARDED GRANTS AND CONTRACTS

Completed

- 2001-2003 fMRI of Unconscious Affect Processing in Adolescence.
NIH, 1R03HD41542-01
PI: **Killgore** (\$79,000.)
- 2003-2006 The Effects of Sleep-Loss and Stimulant Countermeasures on Judgment and Decision Making.
U.S. Army Medical Research and Materiel Command (USAMRMC) Competitive Medical Research Proposal Program (CMRP); Intramural Funding,
PI: **Killgore** (Total Award: \$1,345,000.)
- 2004-2005 Sleep/wake Schedules in 3ID Aviation Brigade Soldiers.
Defense Advanced Research Projects Agency (DARPA)
PI: **Killgore** (Total Award: \$60,000.)
- 2005-2006 Functional Neuroimaging Studies of Neural Processing Changes with Sleep and Sleep Deprivation.
U.S. Army Medical Research and Materiel Command (USAMRMC); Intramural Funding Task Area C (Warfighter Judgment and Decision Making) Program Funding
PI: **Killgore** (Total Award: \$219,400.)
- 2006-2007 Establishing Normative Data Sets for a Series of Tasks to Measure the Cognitive Effects of Operationally Relevant Stressors.
U.S. Army Medical Research and Materiel Command (USAMRMC); Intramural Funding Task Area C (Warfighter Judgment and Decision Making) Program Funding,
PI: **Killgore** (Total Award: \$154,000.)
- 2006-2007 Military Operational Medicine Research Program (MOM-RP), Development of the Sleep History and Readiness Predictor (SHARP).
U.S. Army Medical Research and Materiel Command (USAMRMC); Intramural Funding
PI: **Killgore** (Total Award:\$291,000.)
- 2009-2014 The Neurobiological Basis and Potential Modification of Emotional Intelligence through Affective Behavioral Training (W81XWH-09-1-0730).
U.S. Army Medical Research and Materiel Command (USAMRMC),
PI: **Killgore** (Total Award: \$551,961.)
Major Goal: To identify the neurobiological basis of cognitive and emotional intelligence using functional and structural magnetic resonance imaging.

- 2011-2014 Effects of Bright Light Therapy on Sleep, Cognition, and Brain Function following Mild Traumatic Brain Injury (W81XWH-11-1-0056).
U.S. Army Medical Research and Materiel Command (USAMRMC),
PI: **Killgore** (Total Award: \$941,924)
Major Goal: To evaluate the effectiveness of morning exposure to bright light as a treatment for improving in sleep patterns among individuals with post-concussive syndrome. Effects of improved sleep on recovery due to this treatment will be evaluated using neurocognitive testing as well as functional and structural neuroimaging.
- 2012-2014 Neural Mechanisms of Fear Extinction Across Anxiety Disorders
NIH NIMH
PI: Milad, M. Site Subcontract PI: **Killgore** (Subcontract Award: \$505,065)
Major Goal: To examine the neurocircuitry involved in fear conditioning, extinction, and extinction recall across several major anxiety disorders.
- 2012-2014 Multimodal Neuroimaging to Predict Cognitive Resilience Against Sleep Loss
Defense Advance Research Projects Agency (DARPA) Young Faculty Award in Neuroscience (D12AP00241)
PI: **Killgore** (Total Award: \$445,531)
Major Goal: To combine several neuroimaging techniques, including functional and structural magnetic resonance imaging, diffusion tensor imaging, and magnetic resonance spectroscopy to predict individual resilience to 24 hours of sleep deprivation.
- 2012-2015 Internet Based Cognitive Behavioral Therapy Effects on Depressive Cognitions and Brain function (W81XWH-12-1-0109).
U.S. Army Medical Research and Materiel Command (USAMRMC),
PI: Rauch, SL; Co-PI: **Killgore** (Total Award: \$1,646,045)
Major Goal: To evaluate the effectiveness of an internet-based cognitive behavioral therapy treatment program on improving depressive symptoms, coping and resilience skills, cognitive processing and functional brain activation patterns within the prefrontal cortex.

Current

- 2012-2016 A Model for Predicting Cognitive and Emotional Health from Structural and Functional Neurocircuitry following Traumatic Brain Injury (W81WH-12-0386)
Congressionally Directed Medical Research Program (CDMRP), Psychological Health/Traumatic Brain Injury (PH/TBI) Research Program: Applied Neurotrauma Research Award.
PI: **Killgore** (Total Award: \$2,272,098)
Percent Effort: 25%
Major Goal: To evaluate the relation between axonal damage and neurocognitive performance in patients with traumatic brain injury at multiple points over the recovery trajectory, in order to predict recovery.
- 2014-2017 Bright Light Therapy for Treatment of Sleep Problems following Mild TBI (W81XWH-14-1-0571).

Psychological Health and Traumatic Brain Injury Research Program (PH/TBI RP) Traumatic Brain Injury Research Award-Clinical Trial.

PI: **Killgore** (Total Award: \$1,853,921)

Percent Effort: 40%

Major Goal: To verify the effectiveness of morning exposure to bright light as a treatment for improving in sleep patterns, neurocognitive performance, brain function, and brain structure among individuals with a recent mild traumatic brain injury.

- 2014-2018 A Non-pharmacologic Method for Enhancing Sleep in PTSD (W81XWH-14-1-0570)
Military Operational Medicine Research Program (MOMRP) Joint Program Committee 5 (JPC-5), FY13 Basic and Applied Psychological Health Award (BAPHA)
PI: **Killgore** (Total Award: \$3,821,415)
Percent Effort: 35%
Major Goal: To evaluate the effectiveness of blue light exposure to modify sleep in PTSD and its effects on fear conditioning/extinction, symptom expression, and brain functioning.
- 2015 Effects of Blue Light on Melatonin Levels and EEG Power Density Spectrum
Arizona Area Health Education Centers (AHEC) Program
Co-PI: Alkozei, A.; Co-PI: **Killgore** (Total Award: \$4,373)
Percent Effort: 0%
Major Goal: Adjunctive intramural funding to add a melatonin collection to an ongoing study of the effects of blue wavelength light on alertness and brain function.
- 2014-2018 Refinement and Validation of a Military Emotional Intelligence Training Program (JW150005)
Joint Warfighter Medical Research Program 2015
PI: **Killgore** (Total Award: \$5,977,570)
Percent Effort: 45%
Major Goal: To develop and validate a new internet-based training program to enhance emotional intelligence capacities in military Service Members.

LIST OF COLLABORATORS ON GRANTS AND PUBLICATIONS FROM LAST FIVE YEARS

Acharya, D.	Buchholz, Jennifer L.
Alkozei, Anna	Capaldi, Vincent F.
Athey, A. J.	Castro, Carl A.
Baker, Justin. T.	Chosak, A.
Balkin, Thomas J.	Cohen-Gilbert, Julia E.
Bark, John S.	Conrad, Turner A.
Brennan, Brian P.	Covell, Michael J.
Britton, Jennifer C.	Crowley, David J.
Bruyere, J.	Cui, Jiaolong

Dagher, Joseph
Dahlgren, Mary Kate
Deckersbach, Thilo
DelDonno, Sophie R.
Demers, Lauren A.
Dillon, Daniel G.
Divatia, Shreya C.
Dougherty, Darin
Engle, Charles C.
Estrada, Arthur
Freed, Michael C.
Fridman, Andrew
Fukunaga, Rena
Ginsberg, Jay P.
Gogel, Hannah
Gold, Andrea L.
Gonenc, Atilla
Gruber, Staci A.
Grugle, Nancy, L.
Guerrero, Melanie L.
Hammeroff, Stuart
Hartman, A. S.
Hezel, D.
Hoge, Charles W.
Hudson, James I.
Jenike, Michael A.
Jensen, J. Eric
Jorgensen, Alli L.
Juelich, R. J.
Kamimori, Gary H.
Kamiya, T.
Kaufmann, Marc
Kawada, Y.
Kelley, Amanda M.

Killgore, Desiree B.
Kipman, Maia
Kizielewicz, Jill
Knight, Sara A.
Koehlmoos, T. P.
Krizan, Zlatan
Krupnick, J.
Lane, Richard
Lasko, N. B.
Laundau, A. J.
Leibenluft, E.
Makris, Nicos
Marin, M. F.
Markowski, Sarah M.
Meloni, Edward G.
Milad, Mohammed R
Mundy, Elizabeth A.
Nickerson, Lisa D.
Novak, L.A.
Olson, Elizabeth A.
Orr, Scott P.
Pace-Schott, Edward F.
Papadimitriou, G.
Pauls, D. L.
Pechtel, Pia
Penetar, David M.
Pine, Daniel S.
Pisner, Derek
Pitman, R. K.
Pizzagalli, Diego A.
Pollack, M. H.
Pope, Harrison G.
Post, Alex
Preer (Sonis), Lilly

Price, Lauren M.
Racine, Megan T.
Ragan, J.
Raison, Charles L.
Rauch, Scott L.
Rauch, Shiela
Reichardt, Rebecca M.
Renshaw, Perry F.
Rizzo, Albert (Skip)
Rohan, Michael
Ross, Amy J.
Rosso, Isabelle M.
Rupp, Tracy L.
Ryan, E. M.
Sagar, Kelly A.
Schoenberg, Michael R.
Schwab, Zachary J.
Shane, Bradley R.
Silveri, Marisa M.

Simon, Naomi M.
Smith, Kacie L.
Smith, Ryan S.
Sneider, Jennifer T.
Song, Christina H.
Song, H.
Steward, S. E.
Thomas, Jennifer J.
Tkachenko, Olga
Trksak, George H.
Vanuk, John R.
Webb, Christian A.
Weber, Mareen
Weihs, Karen
Weiner, Melissa R.
White, C. N.
Wilhelm, S.
Yurgelun-Todd, Deborah, A.
Zai, D.

GRADUATE, POSTDOCTORAL, THESIS ADVISORS OR SPONSORS

Steven W. Gangestad, Ph.D.—Undergraduate Senior Honors Thesis Advisor
Lawrence Overby, III, Ph.D.—Masters Thesis Advisor
Bill J. Locke, Ph.D.—Doctoral Thesis Advisor
Keith A. Hawkins, Ph.D.—Doctoral Internship Advisor
Russell L. Adams, Ph.D.—Postdoctoral Fellowship Advisor
James G. Scott, Ph.D.—Postdoctoral Fellowship Advisor
Guila Glosser, Ph.D.—Postdoctoral Fellowship Advisor
Deborah A. Yurgelun-Todd, Ph.D.—Postdoctoral Fellowship Advisor

This is a true and accurate statement of my activities and accomplishments. I understand that misrepresentation in securing promotion and tenure may lead to dismissal or suspension under ABOR Policy 6-201 J.1.b.

William D. “Scott” Killgore, Ph.D.